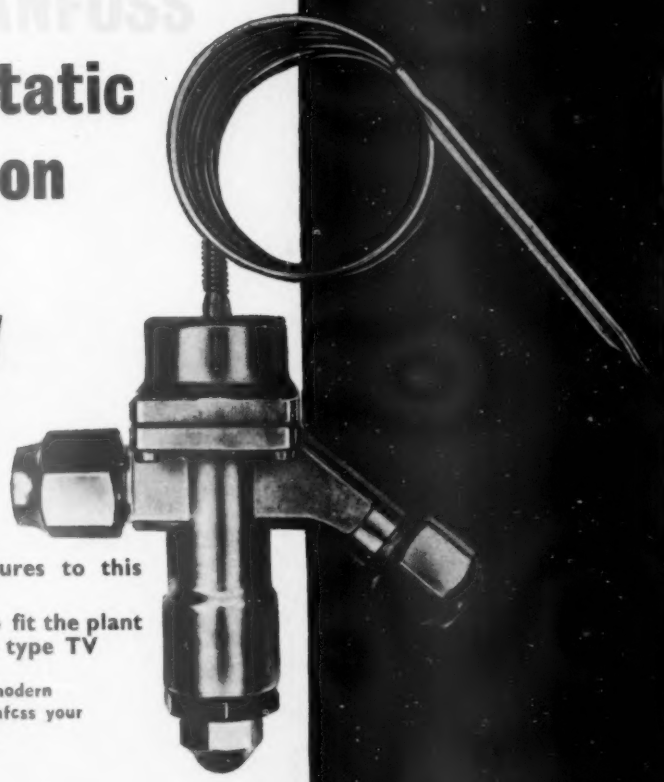
MODERN REFRIGERATION

AND AIR CONTROL

Vol. 63 No. 746 MAY, 1960 Price 2s. 6d. monthly

Concerning the DANFOSS Thermostatic Expansion Valve type TV and TVJ



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4 reasons more to fit the plant with the Danfoss type TV

Take full advantage of modern development—make Danfoss your FAVOURITE CONTROL at no extra cost

1 New NATURAL STONE, CORROSION-FREE NEEDLE right in the heart of the valve adding years to its life

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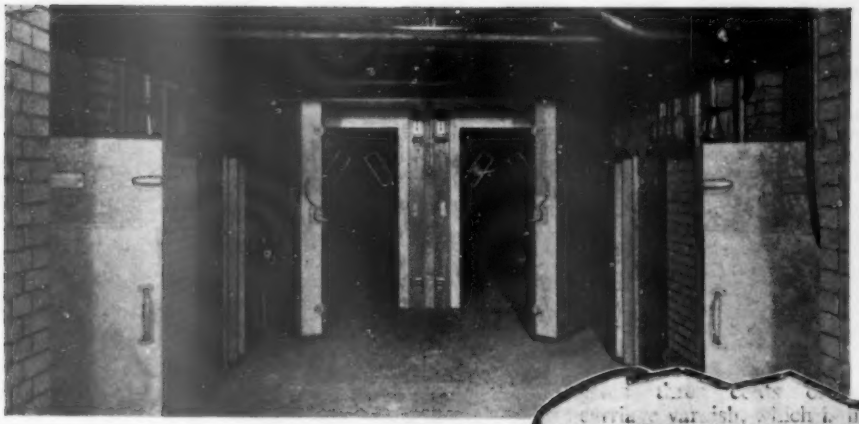

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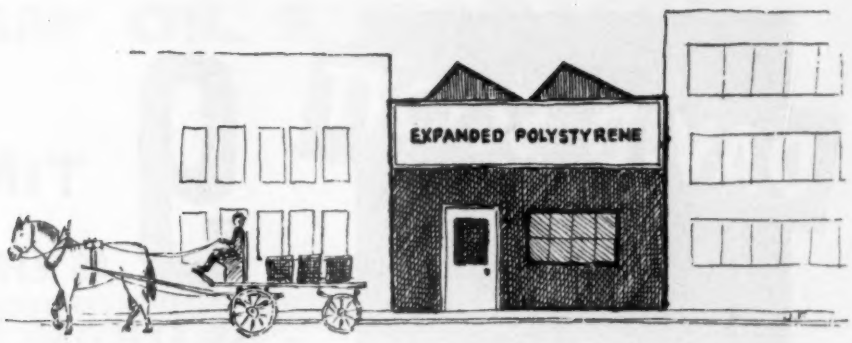

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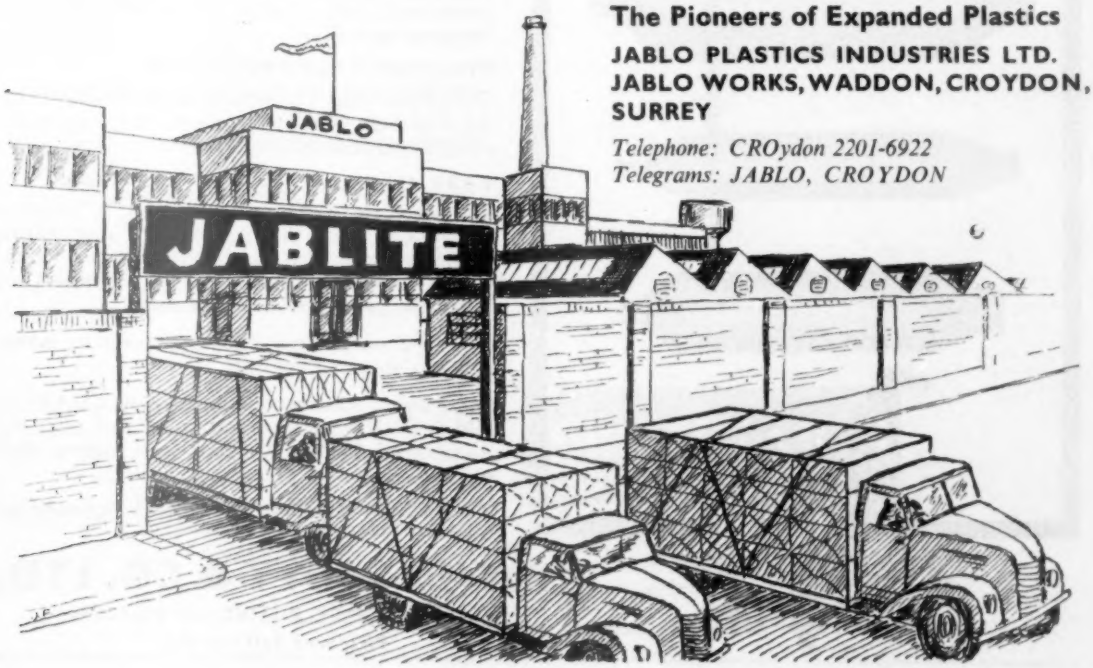
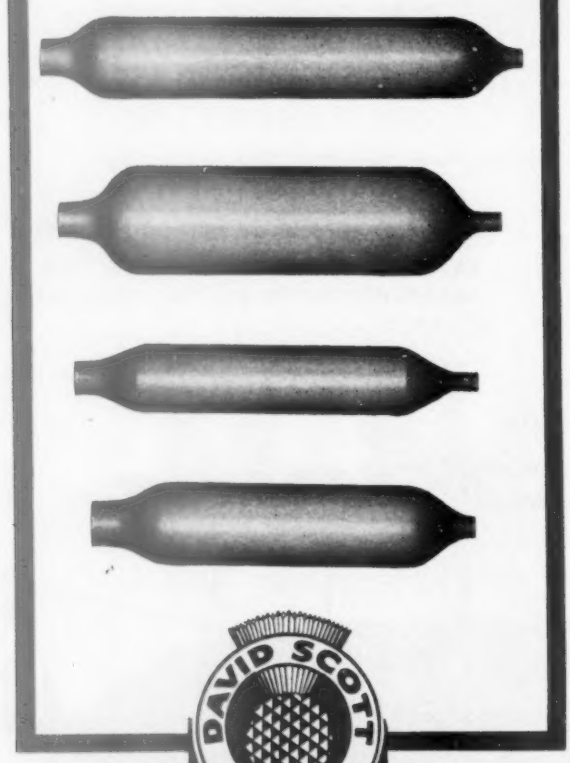


DAVID SCOTT



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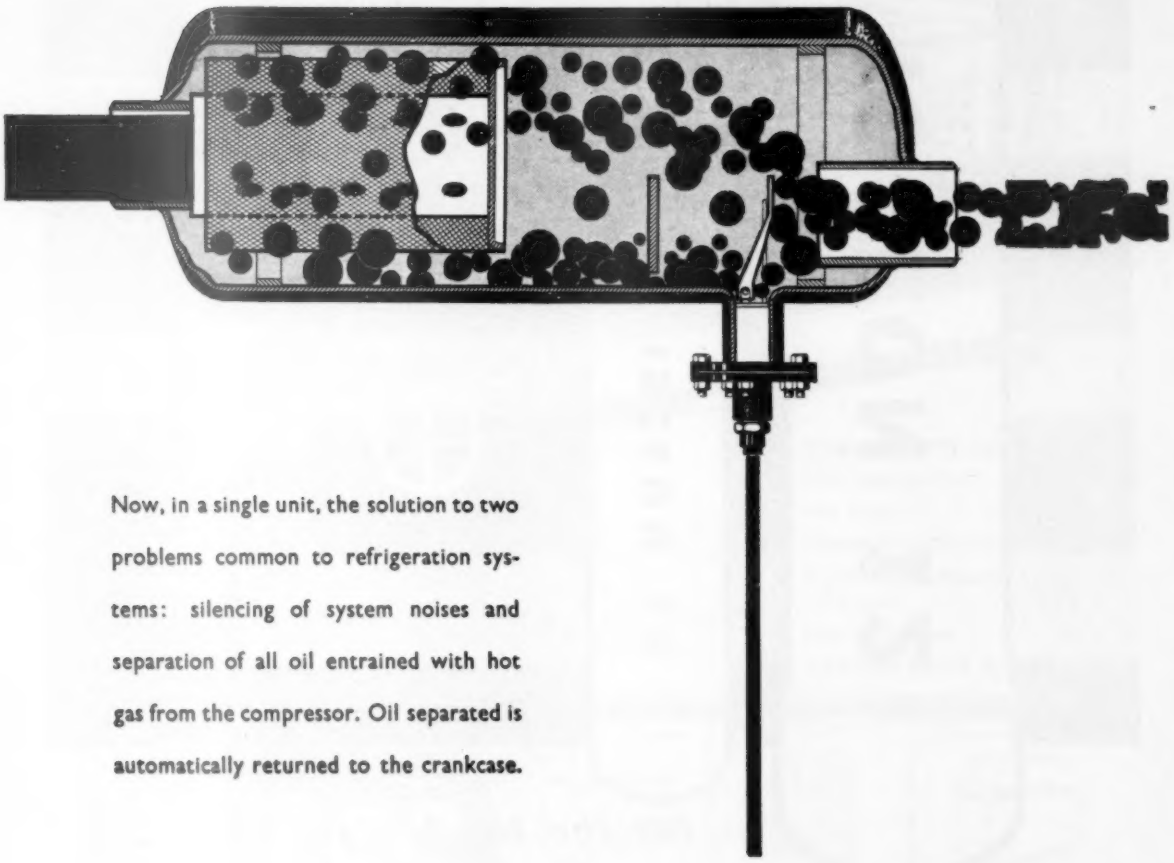

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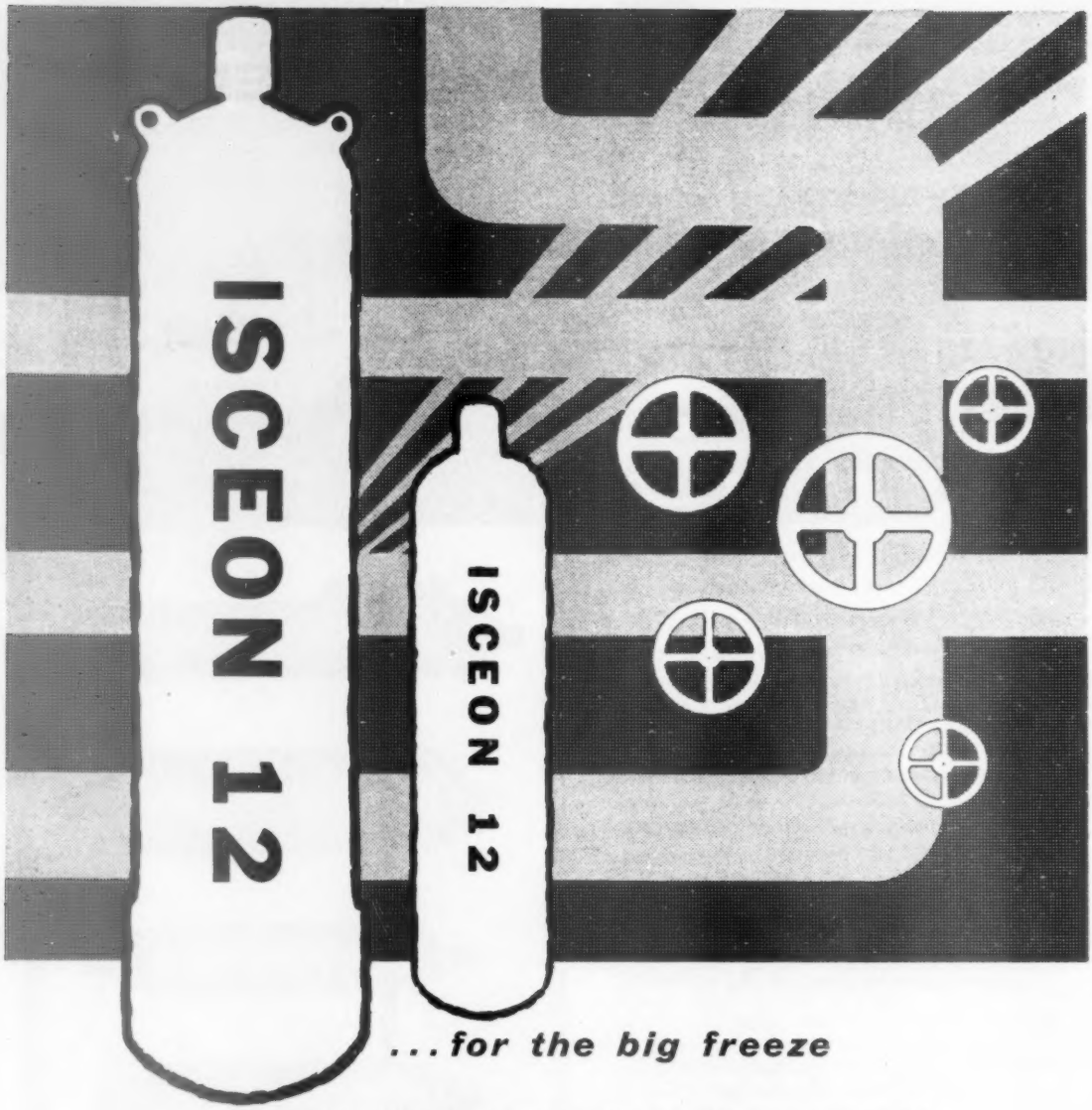

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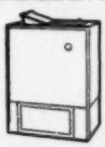

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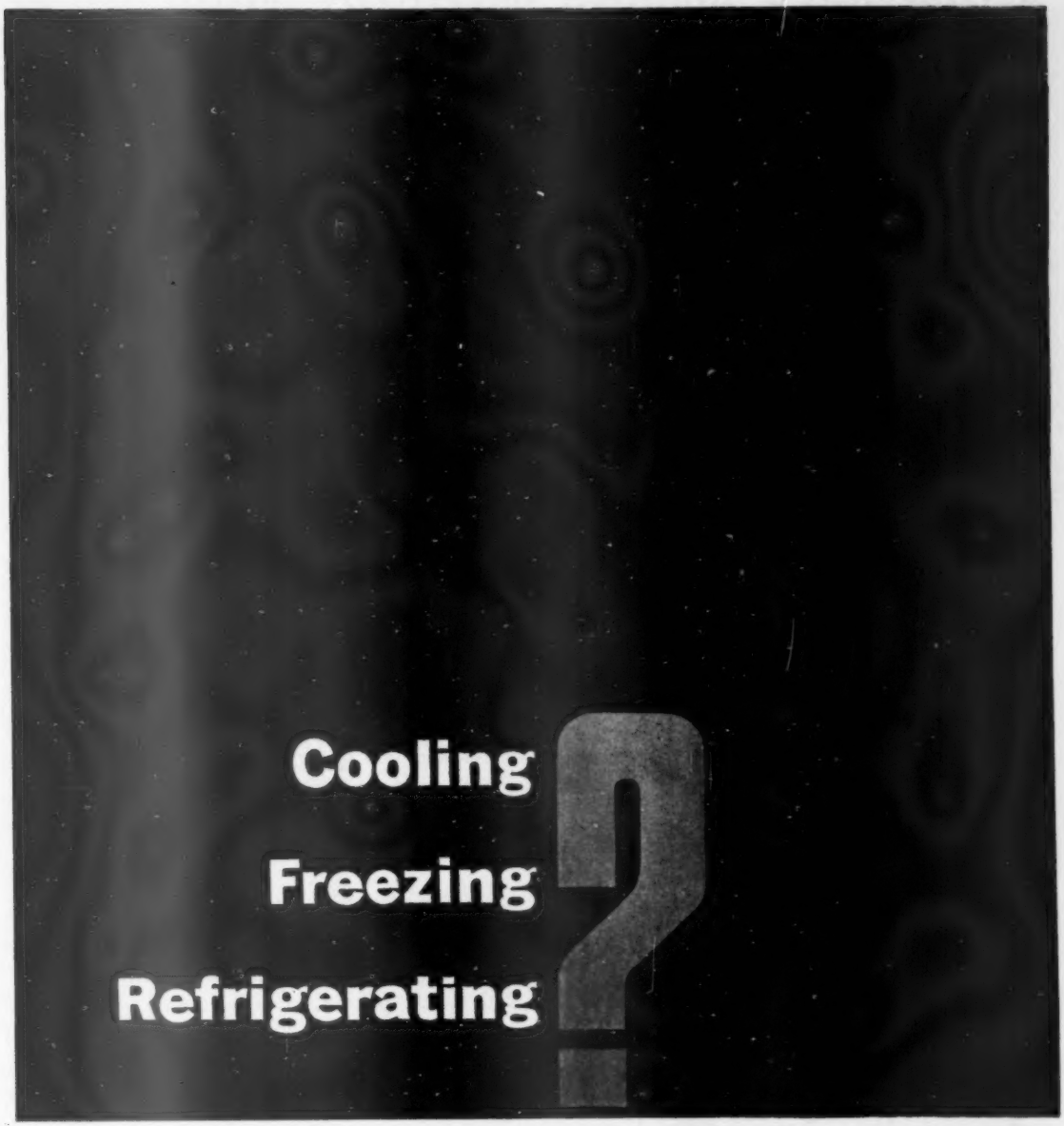

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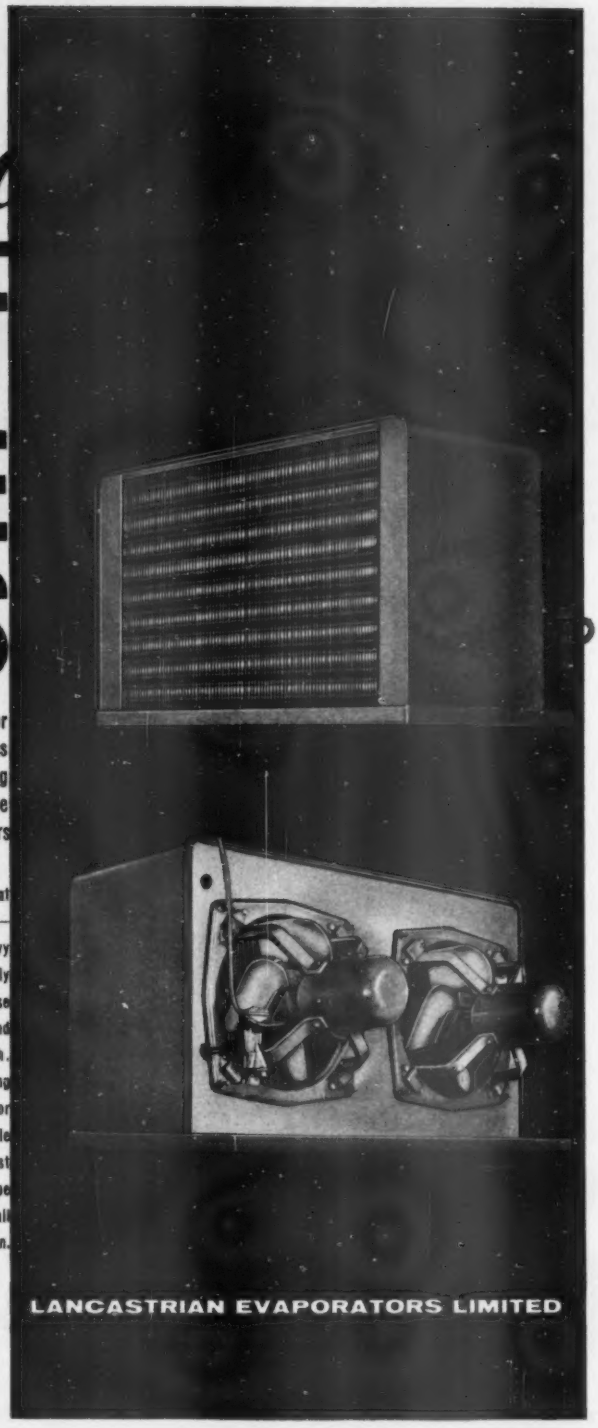

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Designed for continuous cooling at temperature ranges of 0° to 55°F—and soundly constructed from heavy gauge aluminium sheet chemically treated against corrosion—these Units have an attractive and hardwearing finish. With coil bank of tinned copper tubing expanded into light aluminium fins for maximum heat transfer—and available with or without Electric Defrost system—Lancastrian Unit Type Coolers are simple to install and economical to run.

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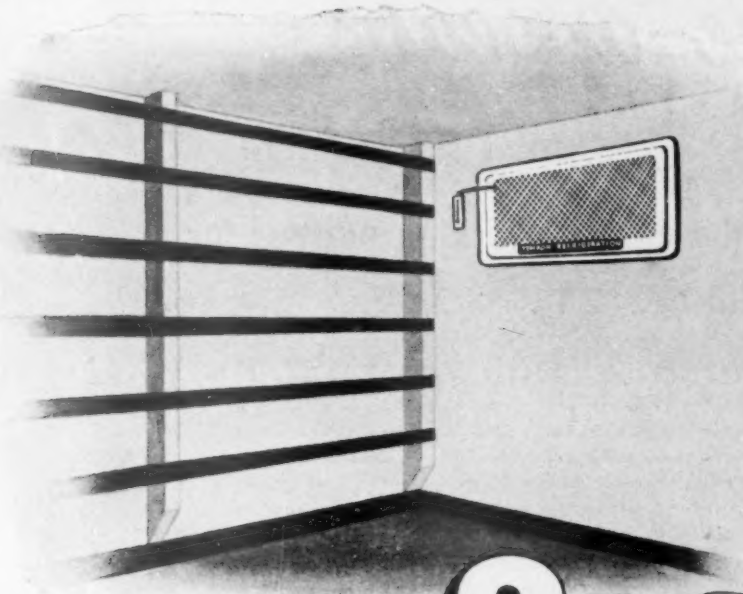

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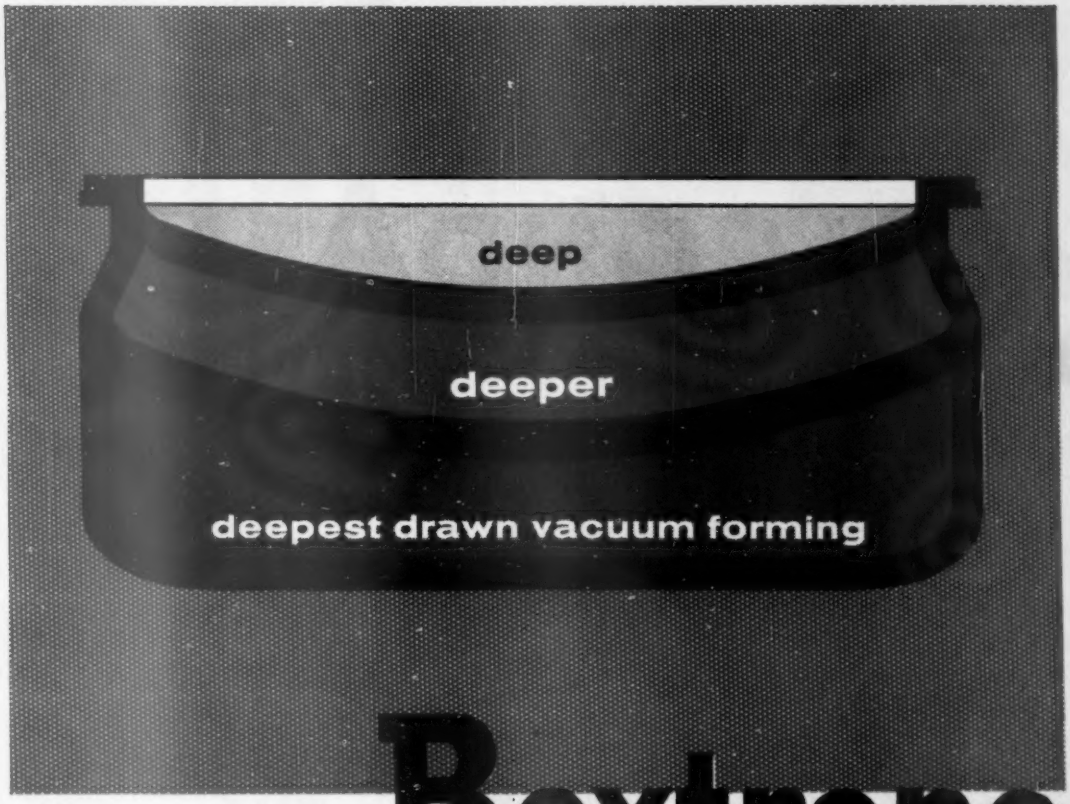

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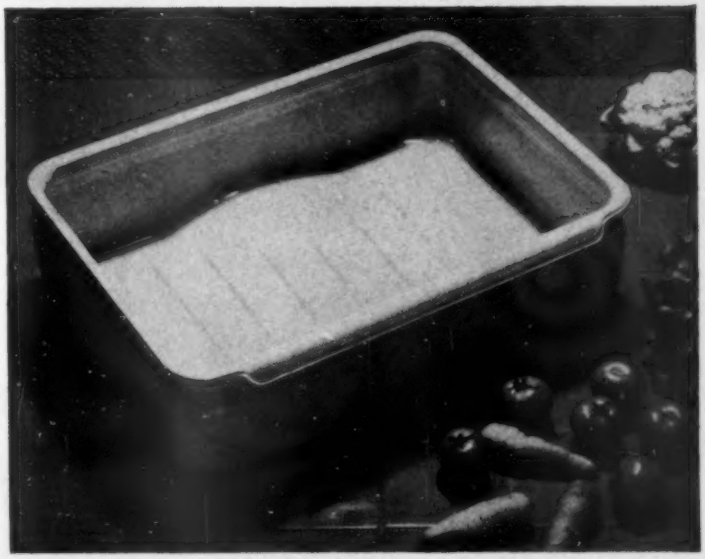
From a flat Bextrene sheet to a deep Hydrator pan. Bextrene toughened polystyrene sheet has that third-dimensional reserve so essential for vacuum forming deep shapes with consistent ease. That's why The General Celluloid Company Ltd. chose tough, easy-forming Bextrene for making this Hydrator pan for the Frigidaire Division of General Motors Ltd. Extruded polystyrene sheets, rolls or panels in opaque colours are by far the most accommodating material for this thermoplastic technique. Write for leaflet and don't hesitate to deep-draw on the wide practical experience of the BX Plastics Technical Service.



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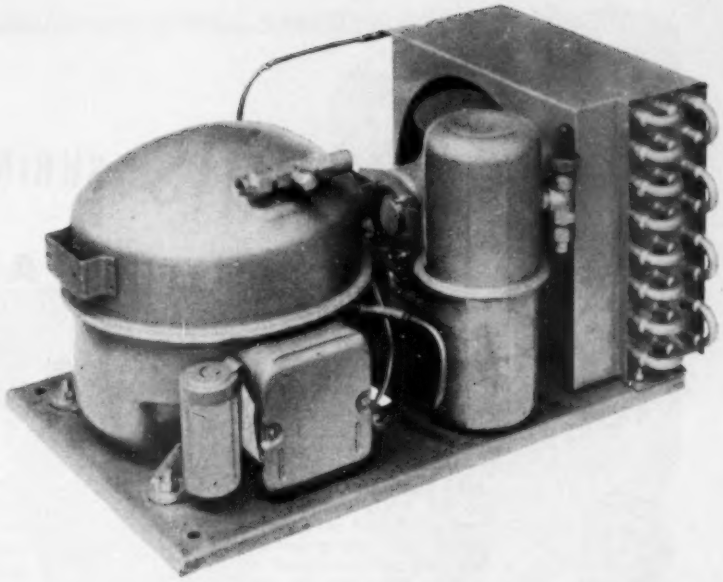

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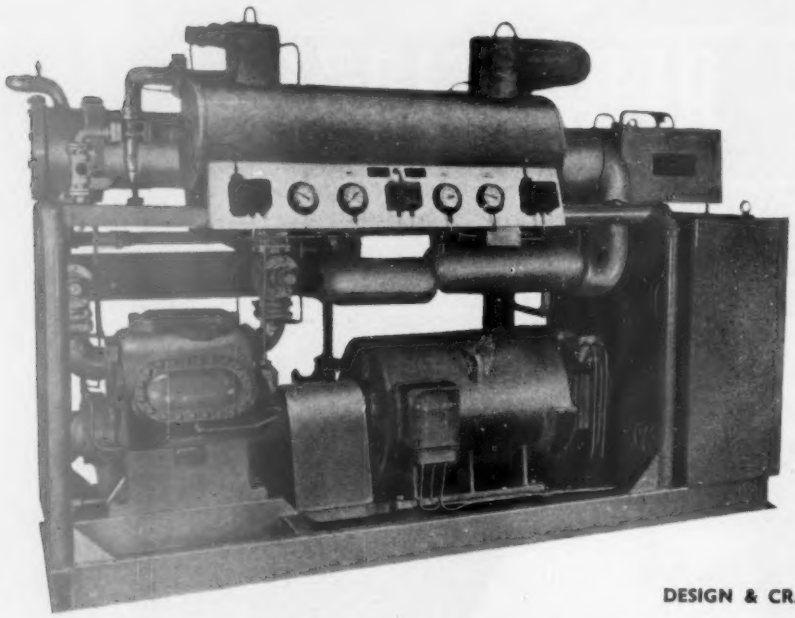

COMPRESSOR
6-cylinder V/W construction 4½-in. bore × 3½ in. stroke, directly driven; 6-pole electric motor. Inbuilt capacity control.

CONDENSER
Extended surface shell and tube type.

EVAPORATOR
Non-ferrous construction throughout for minimum corrosion. Extended surface tubes, direct expansion, minimum refrigerant charge.

PERFORMANCE
Nominal 50 tons, cooling water to 50° F. in designed ambient 120° F. Condenser rated fully tropically, *i.e.* 95° F. flow.

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11 ft. long × 4 ft. wide × 6 ft. 6 in. high.

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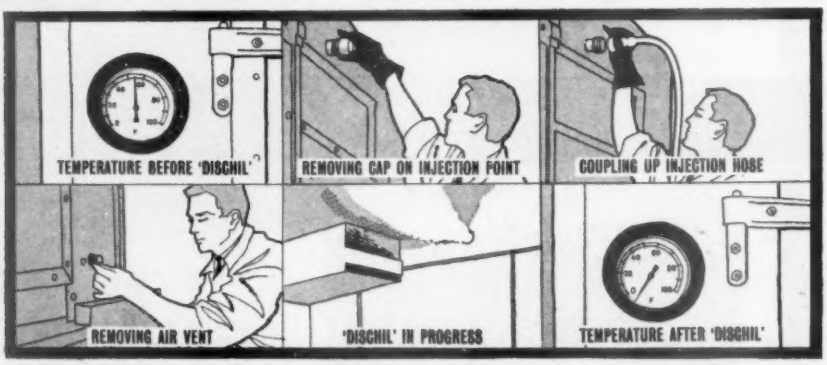

Liquid CO_2 is injected into the vehicle normally after it has been loaded. Very rapid heat extraction from the vehicle shell and contents takes place and the desired operating temperature is reached in a few minutes.

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AND MAKING F.H.P. MOTORS

Something important has been obscured by the success of the mathematical approach to design – that engineering is an art as well as a science. Not everything can be worked out: beyond a certain point – particularly on detail – the designer has to trust his eye, his feeling for a sound job or his imagination. But these, in turn, depend on experience, not his alone; the common stock of the people he works with. This is the art; and it is the channel through which the accumulated experience of an engineering firm is fed back into new products.

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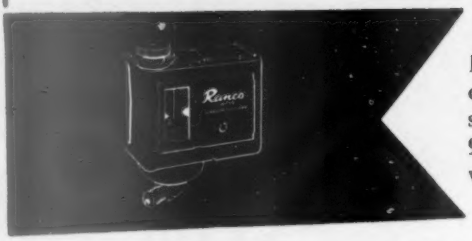
Ranco 'O' series temperature controls provide a single pole snap acting switch either closing the circuit on a rise and opening the circuit on a fall of temperature, or the reverse. The differential screw changes the CUT-OUT only on standard cooling controls: the same adjustment on standard heating controls changes the CUT-IN. Graduated visible scales indicate range and differential settings.

The Ranco 'O' series high pressure controls have been designed for commercial application. Controls can be supplied with various ranges between 100 lbs. per square inch and 350 lbs. per square inch. In all models the adjustable differential is from 30 — 100 lbs.



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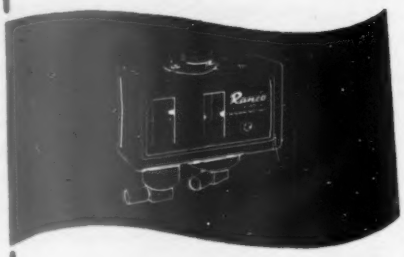

The Ranco 'O' series dual pressure controls combine the characteristics of both the low pressure control and the high pressure control in a single instrument.

For D.C. application all the above 'O' series controls are fitted with a magnet. For any further information please write to:

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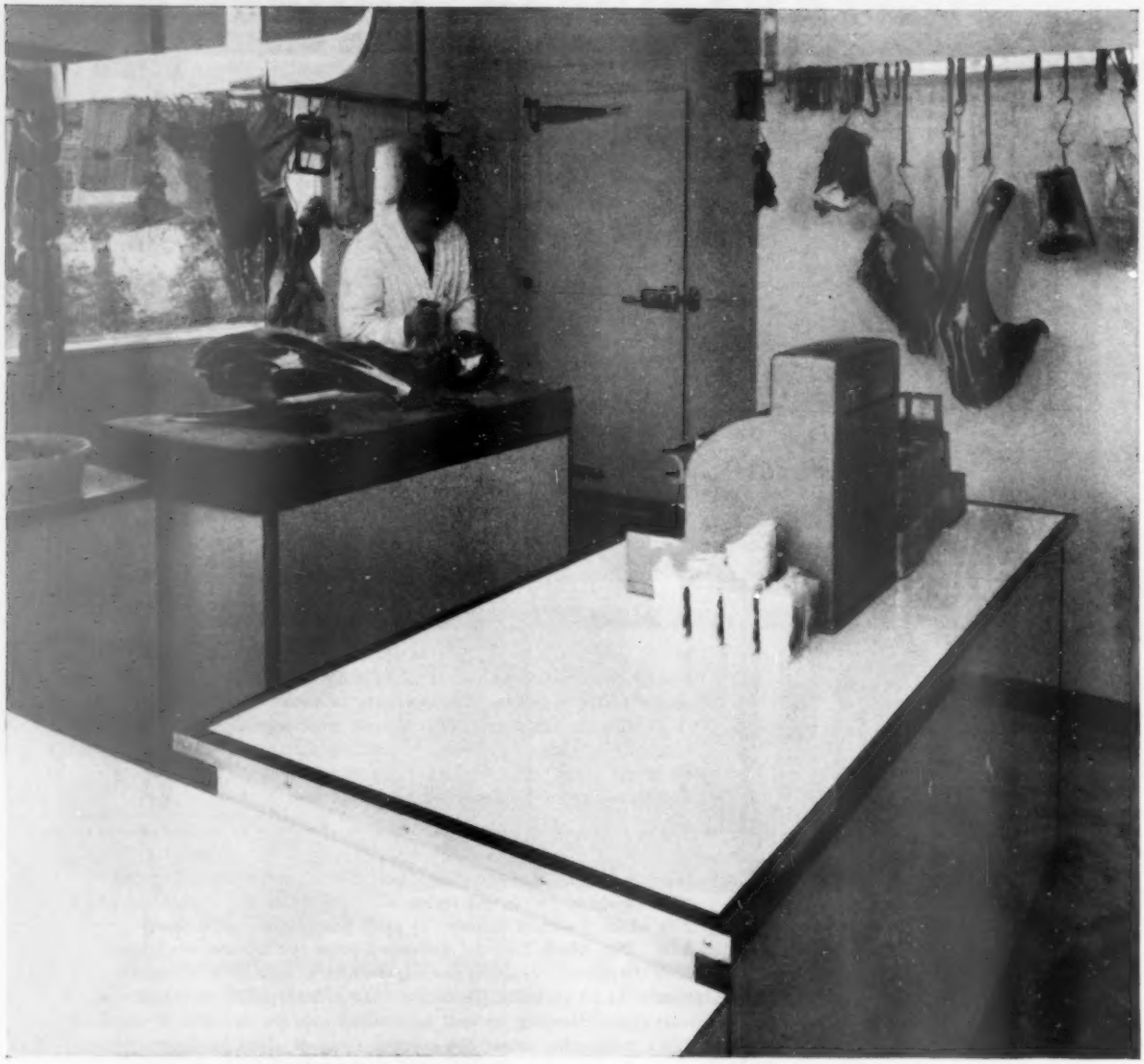

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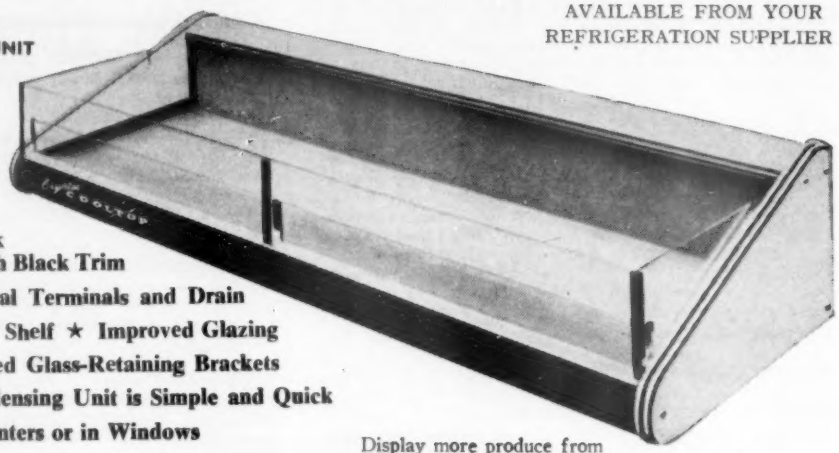

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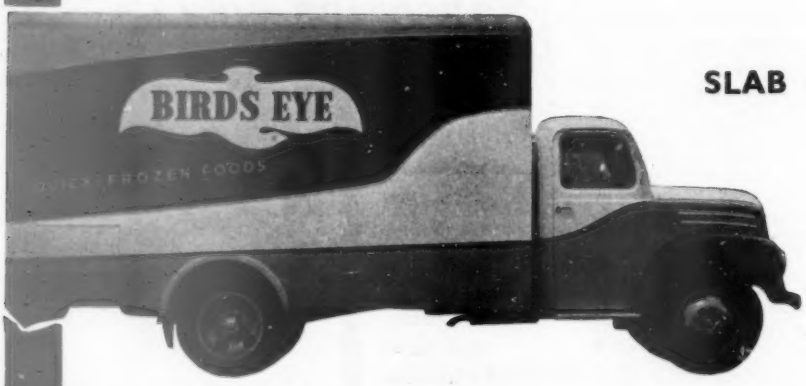

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VOLUME 63 NUMBER 746

MAY · 1960

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A New Application
New Models for S-S Show

● The domestic refrigerator section of our British industry is again this month the focal point for news interest. The February sales figures recently issued by the Domestic Refrigeration Development Committee show another spectacular increase. Sales of British-made domestic refrigerators totalled 85,994 on the home market, compared with 37,728 in February of 1959—an increase of 128 per cent. There was also again a small increase in the sales of domestic refrigerators for export.

● This continued progress in the domestic side of the industry is made still more significant by the fact that two years ago the February sales on the home market were only 16,130. In fact, the sales for the first two months of 1960 have nearly reached the total for the first five months of 1958. As in January, the smaller-size models were the best sellers but there is also a noticeable trend towards the medium and larger size models.

● A subject that seldom hits the headlines these days is ice-making. " M.R." has endeavoured to remedy this situation and has included in this issue a review of modern methods of production (*page 482*).

● Refrigeration has entered yet another field of application. Although the chemical engineering division of W. C. Holmes & Co. Ltd., has designed and installed numerous gas dehydration plants utilizing calcium chloride as the drying agent, the recently completed installation at the Lostock Hall Works, Preston, of the North Western Gas Board is the first to dry town gas by refrigeration, and is, in fact, the first of its type to be installed in the United Kingdom. This plant was primarily installed to dry the high pressure supply boosted to Blackpool, but as it was not anticipated that boosting would be a continuous operation the plant was also designed to dry low pressure supplies as a secondary process. When high pressure gas boosting is in operation, the refrigerated brine is used for the cooling of the high pressure stream. Surplus chilled brine, not required for the high pressure stream, is used to cool the local town gas supply. In this way, maximum use is made of the refrigerating plant capacity, and a useful degree of gas dehydration is maintained on local low pressure supplies.

● The Preston plant has been designed to handle 5,000,000 standard cubic feet of gas per day at pressures of 10–16 p.s.i.g., and to chill the boosted gas to a dew point of 37° F. at all times of the year. Dependent on the load and ambient temperatures, it can also produce an average reduction in dew point of approximately 6° F. in the local low pressure gas stream.

● In operation, the high pressure gas, at approximately 8 to 10 p.s.i.g., passes through an after-cooler where the heat of compression is removed. The gas is then cooled in a heat exchanger with the final chilled gas before passing to the main cooler. The main cooler, which is of cross tube design, is fed with chilled brine by way of a constant head pot from a 6,000 gallon chilled brine storage tank. The chilled gas passes through a mist catcher and finally cools the incoming gas. The operation of this plant will be described more fully next month.

● The food retailer who has been pondering the question of whether or not to adopt the self-service principle will find many innovations at the forthcoming biggest-ever Self Service and Shop Equipment Exhibition, to be held at Olympia from May 23rd to 27th, whereby he can overcome many of the teething troubles experienced by his competitors when they pioneered self service some time ago. The Frigidaire Division of General Motors, for instance, are introducing a completely new range of refrigerated self-service cabinets all of which feature automatic defrosting, and ensure the maintenance of an even temperature at one of three levels—zero degrees Fahrenheit for frozen foods; 28° to 32° for meat and fish; and 40° to 50° for dairy produce and provisions. To be known as the " Talisman " range, they will be available in two capacities—the " six-footers " with approximately 14 c.ft. and the " nine-footers " with 21 c.ft. M. L. Winsor & Co., too, will be displaying two new Swedish quick-frozen food display cabinets fitted with automatic defrosting known as the " Everest " 405 and 605 of 5 ft. and 6ft. 6 in. respectively, both 2 ft. 5¼ in. in width. With this equipment the automatic defrosting is based on the falling air principle operated by heater elements and controlled by time clock. The capacity of the smaller of these is 11·8 c.ft. and of the larger, 15·4 c.ft.

● INTERPLAS 61, the Sixth International Plastics Exhibition and Convention, will be held at Olympia, London, from June 21 to July 1, 1961. So many applications have already been received from new exhibitors that the total available space has been increased to over 300,000 sq. ft. With this heavy and continuing demand intending exhibitors are advised to apply for space as soon as possible. The exhibition, organized by the Iliffe journal *British Plastics*, will again cover all aspects of the industry—basic and semi-processed materials, finished products, industrial components and processing machinery and accessories. Fully representative displays of all types are expected from countries which are active in this field, for any company, whatever the country of origin may exhibit their products at INTERPLAS 61.

● A certain range of bacteria known as psychrophils (from the Greek psychros—cold; philein—to love), which grow profusely at low temperatures, are presenting the refrigeration industry with problems. The widely held assumption that these cold loving (psychrophilic) bacteria are not detrimental to the cold storage of foodstuffs, has received a severe blow by the discovery that they are much more common than was anticipated. They have been found in the intestines of salt and fresh-water fish, in chilled or frozen meat, in raw or pasteurised milk, in cream, butter, tap water, ditch water, in garden soil, fresh or frozen vegetables, flour, in the air, etc.

● To the bacteriologist, the psychrophils are known as serratia, achromobacter, flavobacterium, micrococci, pseudomonas, and others. These micro-organisms are responsible for food spoilage below 10° C. Domestic refrigerators work at temperatures between 3° and 5° C. and it is at this level that bacterial activity quickly develops. Dr. W. Summer will be writing on this subject next month.

● The Research Laboratories of The General Electric Co. Ltd., at Wembley, Middlesex, claim to have made the world's first prototype thermo-electric cold box. The system offers the advantages of lightness, no moving or wearing parts, silent operation and the avoidance of the use of chemical refrigerants; furthermore, it can operate directly from a battery d.c. supply, useful for cars, trains etc.

REFRIGERATION EXHIBITIONS

A Statement by the British Refrigeration Association

THIS Association has had frequent suggestions that it should take an active part in arranging exhibitions of the products of the refrigeration industry and the opinion of the industry on this question has, therefore, been regularly ascertained.

It seems now that the year 1962 would be opportune for an exhibition of the products of all sections of the refrigeration industry, both British and foreign, provided the policy of the exhibition were in the best interests of the exhibitors and those attending. In these circumstances the council of the Association has agreed that such an exhibition should be held.

A committee with power to co-opt representatives of all other interested bodies, including the technical press, has been appointed to progress the arrangements and in particular to appoint an organizer. Further details will be announced as they become available.

Enquiries from experienced exhibition organizers with London facilities in 1962 can be made to the Association.

REFRIGERATION EXHIBITION, 1962

A Statement by Refrigeration Press Limited

THE refrigeration exhibition tangle has been unravelled. After Refrigeration Press Limited had announced, in January, that a refrigeration exhibition—of which they were to be sponsors—was being organized for 1961, news appeared of another event for the same year. Thus two refrigeration shows were being planned for 1961, a situation that was obviously not in the best interests of the industry.

Our organizers immediately strove for an amalgamation of interests with the second organizing body : the friendly hand was extended ; it was not clasped.

The B.R.A. wisely considered the situation at a council meeting and requested the two outside organizing interests to meet their special committee. Contemporary Exhibitions Ltd., and Refrigeration Press Limited, their sponsors, gladly complied with this request and agreed, for the good of the industry, to defer their 1961 exhibition to 1962 provided that the B.R.A. would give it their blessing. As can be seen from the next column, the B.R.A. have agreed to a 1962 show ; in fact, they have gone further and have taken a lead in forming a committee to " progress the arrangements."

R.P.L. has thus continued to keep in step with the industry's wishes and looks forward to playing a leading part in the spring, 1962, event.

NEWS OF THE MONTH

Refrigeration and A-c. Exports.—During March, 1960, air-conditioning and refrigerating machinery (commercial and industrial sizes) to the value of £885,503 weighing 1,245 tons, was exported from the United Kingdom. Comparable figures for March 1959 were 1,225 tons, worth £755,923.

* * *

Exports' Analysis.—Of the 1,245 tons of air-conditioning and refrigerating plant worth £885,503 exported by Great Britain in March —quoted in the preceding paragraph—74 tons went to the Union of South Africa, 103 tons to India, 37 tons to Australia, 40 tons to New Zealand, 72 tons to Canada, 242 tons to "other Commonwealth countries," 51 tons to Eire, 12 tons to Sweden, 179 tons to Western Germany, 64 tons to the Netherlands, 97 tons to Belgium, 22 tons to France, 57 tons to Italy, and 195 tons to "other foreign countries."

* * *

Refrigeration Plant Classified.—Of the total exports of air-conditioning and refrigerating machinery during March, commercial refrigerators accounted for 372 tons, worth £193,238, industrial plant and equipment for 146 tons worth £113,416, and refrigerating machinery, equipment and parts, including parts of commercial refrigerators for 406 tons, worth £333,194.

* * *

Exports of Small Refrigerators.—During March, 1,213 tons of complete refrigerators and domestic refrigeration equipment were sent overseas from Great Britain. These exports were worth £754,735. The 1,213 tons comprised 33 tons to the Union of South Africa, 31 tons to Rhodesia and Nyasaland, 16 tons to India, 31 tons to New Zealand, 571 tons to "other Commonwealth countries and Eire," 65 tons to Sweden, 21 tons to Western Germany, 17 tons to the Netherlands, 21 tons to Belgium, 11 tons to Italy, and 396 tons to "other foreign countries."

* * *

Flower Chilling.—Research work is being done in Angus on chilling of flowers for the English market. Mr. David A. Lawson, of Messrs Lawson of Kirriemuir, installed plant last year to chill raspberries for the Midlands and South of England. A 5-ton capacity store has been used on this work to reduce temperature of rasps before transportation by insulated van to the fresh fruit trade in England. Last year over 500 tons of soft fruit were sent this way to the South, with complete success. Daffodils are also grown to a limited extent and work has been launched to determine how far chilling can apply in this context. In co-operation with the horticultural section of the north region of the Edinburgh College, experiments have been started to determine the scope of daffodil preservation. Daffodils picked at the bud stage have been stored in water. Others, with the flowers showing, have been boxed without water. Temperature used is 35°. On the results of this experiment the firm plans to determine whether chilling of flowers for the market can be regarded as a sound proposition.

* * *

Shorter Hours.—All weekly and hourly-paid employees of Frigidaire Division of General Motors, Ltd., Stag Lane, Kingsbury, who were previously engaged on a 42½-hour week, will now finish work half an hour earlier on Fridays, giving them a 42 hour week. Employees who had been working a 40 hour week, including all secretarial and administrative staff, have their hours reduced to 38½.

This telling chart, prepared and shown by DoRDeC in London recently, shows, in effect, that the cost of even a small amount of food wastage per week makes worthwhile, viewed simply from the economic standpoint, the ownership of a modern refrigerator.

STERNE'S CHAIRMAN RETIRES

At a presentation dinner held at the Dorchester Hotel, London, recently, L. Sterne and Company Limited's directors bade farewell to their chairman, Sir Samuel R. Beale, K.B.E., and to their export director, Mr. F. E. Kewley. Reading from left to right of the photograph is Mr. F. E. Kewley, Sir Samuel R. Beale, K.B.E., Mr. Edward Elliott, Mr. E. Walker Elliott, Mr. P. B. H. Brown, now chairman and joint managing director, Mr. J. Douglas, Mr. D. S. Carruthers, joint managing director, Hermetic Unit Division, Mr. W. R. Houston and Mr. R. S. Beale. Sir Samuel joined the company in 1903, having taken an engineering degree at Cambridge University and, incidentally, having rowed in the winning Cambridge crew that year. At one time Sir Samuel held many directorships, including the L.M.S. Railway and the Union Bank of Scotland.

Sima's Expanding Membership.—The expansion of the Scientific Instrument Manufacturers' Association of Great Britain (SIMA), Sima House, 20, Queen Anne Street, W.1, continues, for four new members and two associate members were recently elected by SIMA Council. This brings the total now to 149 full members and 30 associate members, making a total of 179 firms in SIMA.

Picture of the Month

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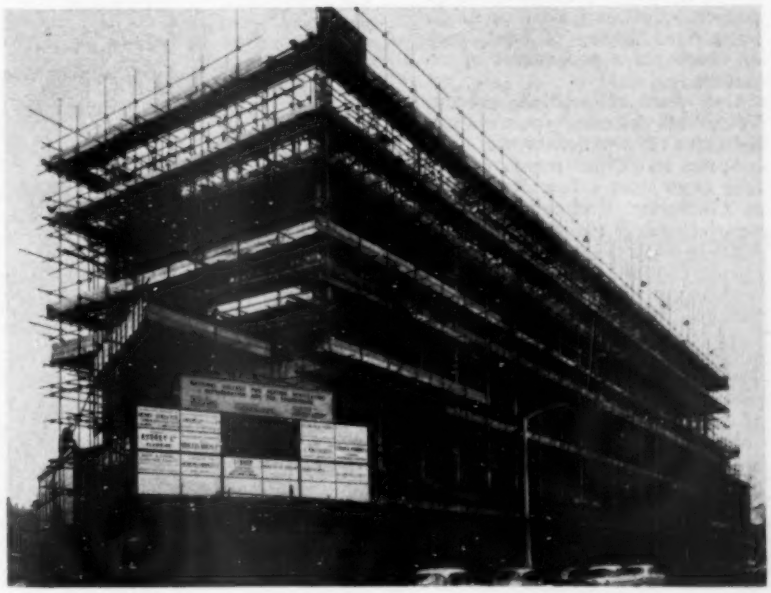


"M.R." photographer's recent view of the new building in The Borough, London, of The National College for Heating, Ventilating, Refrigeration and Fan Engineering.

By OUR RETAIL CORRESPONDENT

SUPER-MERCHANDIZING *MEANS* SUPER-REFRIGERATION

I dislike the term supermarket. So also do some of the companies operating the large-scale self-service stores so described. Its use is avoided by two of the companies whose refrigeration installations are here described. The application of the prefix *super-* has now reached the stage of *reductio ad adsurdum :* the term *superette* is applied to the smaller self-service stores, and that is tantamount to saying dwarf-giant. Nevertheless the term supermarket must be accepted, for it has come into general use by the public. I have used the prefix twice in the title to drive home an important point.

THE supermarkets are increasing in number and become far more widespread. I am surveying this expansion of large-scale self-service stores this month mainly as a means of meat-merchandizing. It seems to me that its expansion in this respect cannot fail to bring favourable results to the refrigeration industry : first because the average supermarket now being opened seldom has fewer than 10 or 12 refrigerated display cabinets and two cold-rooms, and at least one-third of the space thus occupied will be given up to meat ; secondly, because it is bound to impress upon individual (and may be also multiple) butchers the need to bring their premises up-to-date by increasing their use of refrigeration.

Here are just three examples of firms in the grocery trade who are operating supermarkets with a large proportion of space given up to the refrigerated display of meat, each of which has a programme of expansion.

One firm of multiple grocers, Tesco Ltd., for many years associated with a rather unique type of small cut-price shops, last month opened four more giant self-service stores : at Colchester, Cheltenham, Portsmouth, and Warwick Way, near Victoria Station, London, and there are more to follow.

There are six supermarkets operated by two multiple companies : Laws Stores, Ltd. and L. & N. Stores Ltd. in the Newcastle upon Tyne area, and both firms will have opened several more before the end of the year.

Elmo Ltd., a small multiple grocery company which opened its first supermarket in Leicester in December, are opening another one in Kings Lynn this month. Interesting features of the meat section in the Leicester store are the canopy of opalescent glass, and the incorporation of the scale counters into the run of Hussmann cabinets.

These representative examples typify what is going on all over the country. The movement for large-scale self-service trading, for one-stop shopping, as it is called, which for some years was concentrated in and around London has now become nation-wide. The effect of this continuing expansion cannot fail to change the methods of merchandizing meat, and it is a movement on which makers and distributors of refrigerated display cabinets should keep themselves fully informed.

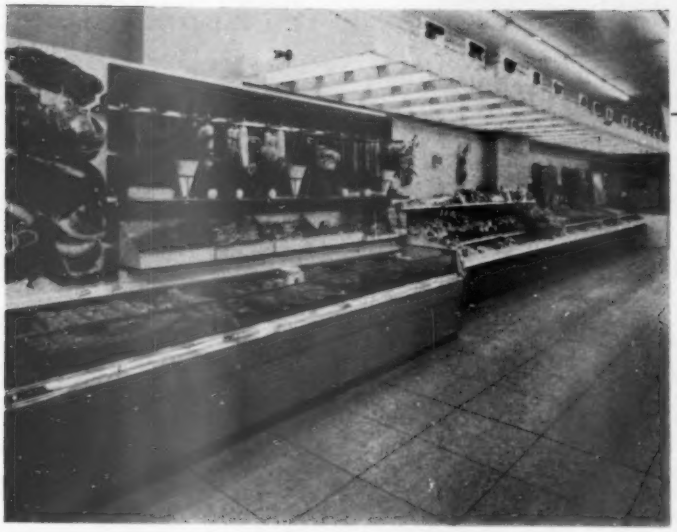
No supermarket is complete without a butchery department, and in many of them, that section, consisting of a long line of refrigerated display, is a major attraction.

One recent, though perhaps not quite typical, example is the latest branch of Prideaux's (London) Ltd., opened at 194, Streatham High Road, London, S.W.6. I say not quite typical because the Prideaux business unlike most supermarkets, has not developed from the grocery trade, but is built on a foundation of meat.

When Mr. W. J. Prideaux, a butcher with two shops in Brixton, converted one of them to self-service (he was one of the first and still is one of the few butchers to take this step), he included other foods but gave most attention to, and used most of the space for, the refrigerated display of ready-wrapped meat.

That shop was a pioneer and a prototype. It demonstrated more effectively than ever before the potentialities of the new method of

The meat department in the Elmo supermarket at Leicester



On the right-hand side of the Prideaux supermarket at Streatham, there is a run of refrigerated cabinets for sausages and cooked foods and delicatessen.

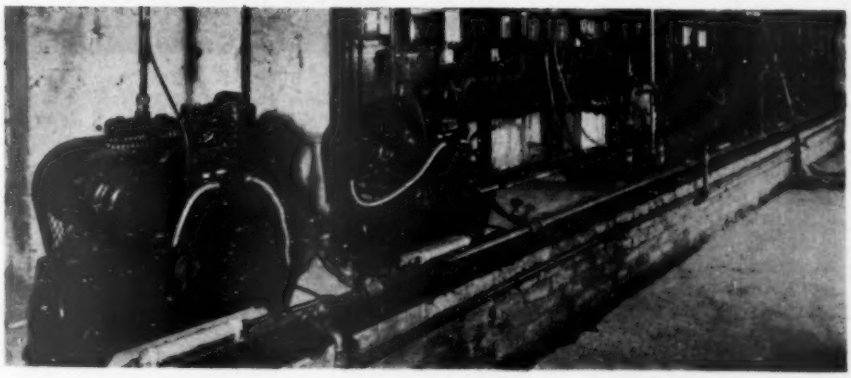
merchandizing meat by the combined operations of pre-packaging and refrigerated display. Although this self-service shop was only 40 ft. by 24 ft. it was equipped with refrigerated cabinets totalling 54 ft. in length.

In April 1958, Prideaux's (London) Ltd., having proved this method of meat selling to be a practical and profitable proposition, opened a 4,500 sq. ft. store in Croydon, given up to all foods except fruit and vegetables. Here the meat section occupies the full width of the store at the back. In addition there is a 24-ft. long cabinet for ready-wrapped meat other than joints, 20-ft. for pre-packaged joints, and 10-ft. for poultry : a total of 74 ft. for meat and poultry, in addition to a 12-ft. island for cooked meats, 12-ft. for sausages, 16-ft. for provisions, and 12-ft. for frozen foods. Refrigerated storage facilities behind the meat cutting room comprise a fresh meat cold-room (1,000 ft.) and a provision cold-room (500 c.ft.) by Prestcold.

The latest Prideaux development is another self-service store of supermarket proportions opened in March at High Road, Streatham, where there is a total length of approximately 120 ft. of refrigerated display space and a total cold-room capacity of 2,700 c.ft. made up as follows : fresh meat 2.000 c.ft., cooked meat 350 c.ft., vegetables 350 c.ft.

Here all the operating machinery

The long run of Hussmann cabinets for refrigerated meat display in the supermarket of Bayliss the Grocers Ltd. converted from five shops at Reading.



All the compressors for cabinets and coldrooms at the Prideaux store at Streatham are completely housed below ground level.

The three-decker cascade cabinets in the Bayliss self-service store at Reading. The frozen food cabinets are seen on the extreme right.

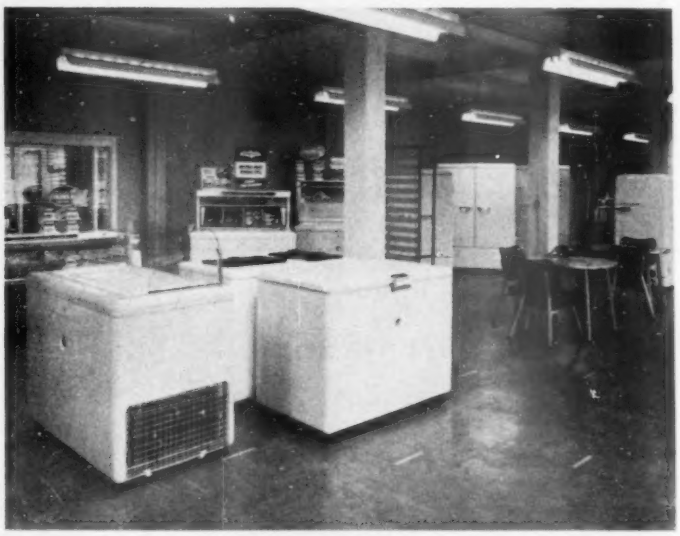
is compactly installed below ground level in a small space accessible by an iron ladder from the meat cutting room.

One further example is provided by Bayliss the Grocer Ltd. of Reading. This family firm now operating self-service branches in Abingdon, Caversham, Newbury, and at another branch in Reading, has recently converted its central premises consisting of five adjoining shops into one large self-service store of supermarket dimensions.

This firm first introduced ready-wrapped meat in 1956, starting with an 18-ft.-long run of refrigerated cabinet. In the just completed converted store they have a 35 ft. 6 in. run for meat alone. The 19-ft. cabinet in former use for meat has been incorporated into a 24-ft. run of cooked meat display. There is also an island cabinet given up to frozen foods.

All the installations illustrated are by Hussmann British Refrigeration Ltd.

PRESTCOLD London Headquarters



ALL the interests of the London region headquarters of the Prestcold Division of the Pressed Steel Co. Ltd. have recently been centralized in new premises at 409 Halifax Road, Greenford, where 100,000 sq. ft. of floor space are available. These new headquarters have absorbed the administrative offices formerly in Sceptre House, Regent Street, and the service centre from Chiswick. They also house the stocks of refrigerators and commercial refrigeration equipment previously stored at the Hammersmith warehouse. Of these superseded premises, only Sceptre House, a prominent London landmark, is retained as a showroom and demonstration centre, in the heart of the West End.

Controlling these new headquarters is Mr. M. S. Ware, Prestcold's general manager, London region. Mr. J. Parker is deputy general manager, Mr. E. C. Thomson is service and supplies manager and Mr. H. W. J. Bartholomew is commercial sales manager.

In preparing these new premises, which were designed entirely by staff engineers, Prestcold have taken advantage of the extra space available to extend and improve every department. There are excellent

Four views of the new Greenford premises, showing the radio control system for vehicles; part of the stock bays; the canteen and the general office.

and comprehensive workshop facilities and the sales engineering department dealing with special installations and particular technical problems, has been more than doubled in size. A new radio control room has been built for the increasing fleet of service vehicles, all of which have two-way radio.

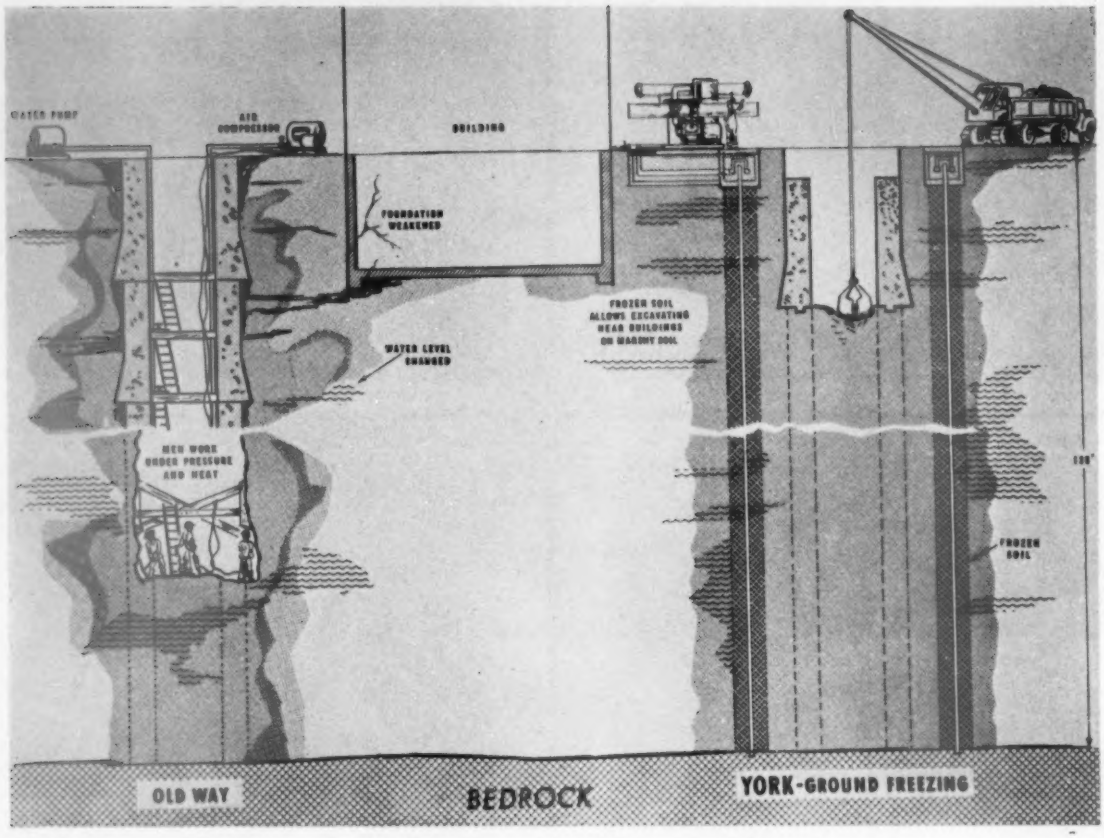
In charge of the contracts department, also centralized at Greenford, is Mr. P. F. Hodge. This department deals with large scale contracts placed with the company by nationally known users of Prestcold refrigeration.

Completely new is the 2,000 sq. ft. display room. An extensive range of commercial and domestic refrigeration equipment is available for inspection and it complements the Sceptre House showroom. This Greenford showroom probably has the most comprehensive and varied displays of such equipment in the London area.

FRIGIDAIRE CAMPAIGN

"No mere picture can do justice to a genuine Frigidaire" is the message conveyed by actor James Robertson Justice, whose familiar features are prominent on all press and point-of-sale advertising by Frigidaire for 1960. The campaign to launch the new range of seven domestic refrigerators, from 3·4 to 10·1 c.ft., has opened with half-pages in the *Daily Express* and *Daily Mirror* and whole pages in *Woman*, *Woman's Own*, *Good Housekeeping*, *Reader's Digest*, *Today* (the *New John Bull*), *Home*, *Ideal Home* and *House and Garden*. Advertising will be concentrated in the peak buying period up to and including July. James Robertson Justice will also be Frigidaire's ambassador in television commercials at peak time on all stations during May, June and July.

Mr. D. A. Reader has been appointed a director and general manager of **Morphy-Richards (Sales & Services) Ltd.** On March 1 the Group marketing and service organization was transferred to this subsidiary of Morphy-Richards Ltd. Mr. Reader joined the group last year as marketing manager. In addition, Mr. Reader has been appointed a director of the other two recently-formed M–R subsidiary companies.



Freezing Soil in Civil Engineering Work

ALTHOUGH the principle of freezing soil for tunnel and dam work is not new, an interesting application, believed to be the first of its type in the U.S.A., is being operated at the Newtown Creek Pollution project. Here an artificially frozen column of marshy soil, 123 ft. deep and more than 40 ft. in diameter, is being used to sink a vertical shaft on the banks of the East River in New York City. After striking bed rock at 123 ft. the shaft will continue down and under the river to Brooklyn. It was decided to use this method to avoid any lowering of the water table or movement of sub-surface formations that could endanger foundations of nearby buildings.

The contractor has two packaged York refrigeration systems, each of which is a platform-mounted unit capable of freezing a standard 85 ft. by 185 ft. skating rink, available for resale after the job is completed. This will keep equipment costs for this phase of the work at a minimum.

There are two 55-ton reciprocating ammonia brine chillers with necessary controls and equipment. The units were supplied and installed by the York Division of Borg-Warner Corporation, York, Pennsylvania. This system supplies 17 degree brine to 21 pipes arranged in a circle 26½ ft. in diameter. The 6 in. pipes are arranged approximately 4 ft. apart and contain 2 in. centre pipes which direct the brine to the bottom of the larger pipe.

Thermocouples at the inlet and outlet of each freeze pipe give accurate readings and permit control of temperature to ensure even freezing and uniform closure of the frozen circle. An extra pipe, not connected to the refrigeration system, and with thermocouples every 10 ft., is in the centre of the circle to give temperature readings in that area and provide a relief as pressure builds up in the centre of the frozen core.

Before starting operations, the capacity of the refrigeration plant to accomplish freezing in 60 days was determined. It was decided to furnish two ammonia brine cooling systems so that, by installing and cross-connecting two brine pumps, it would be possible to operate either refrigeration system or brine pump in case of a failure

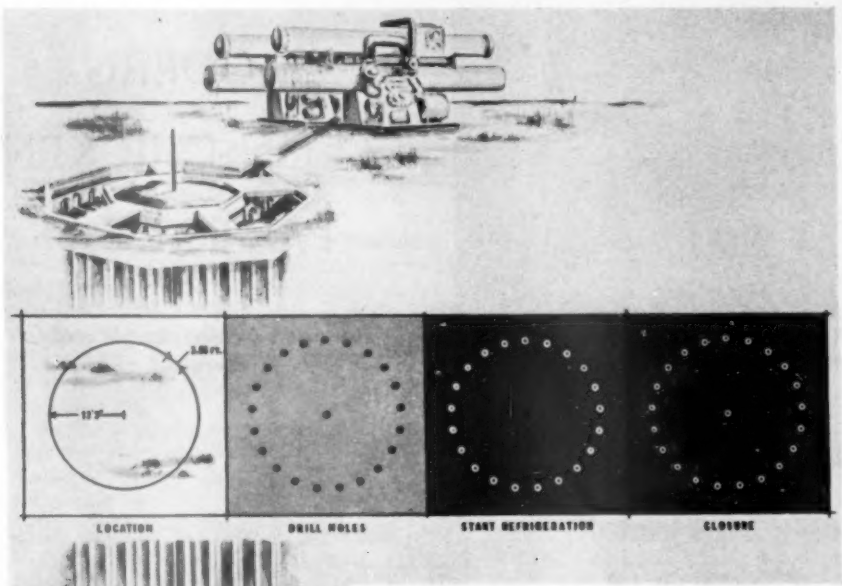
of either unit or pump. Each refrigeration unit consisted of a compressor, motor, condenser, cooler and suction trap. It was decided to build each unit on a structural steel base so that each system would be a complete " package."

The freeze hole drilling was done by Pennsylvania Drilling Co. of Pittsburgh, Pa. on a sub-contract basis. When the freeze hole drilling was started, it was found that the shaft location was astride a concrete wall 3 ft. thick and 10 ft. deep, resting on heavy timber capping that was attached to timber piling 25 ft. to 30 ft. in length. This condition was unexpected and had any other method but freezing been used, it would have greatly complicated this phase of the excavation. The freeze holes were drilled with a truck mounted rotary drill using Hughes Tri-Cone bits to make a hole 8¾ in. in diameter. The average spacing of the freeze holes when completed was 4·103 ft. at the full depth of 123 ft.

After the freeze holes were drilled, the freeze pipes were installed and hydrostatically tested for tightness. Then the brine connections were made and the brine circulation to each hole was adjusted. While the brine flow was being adjusted and circulated with the refrigerating plant not operating, the brine was brought up to 1·265 specific gravity by the addition of calcium chloride. When the brine was at full strength, the refrigerating plant was put into operation.

The cycle starts by pumping the brine through the supply manifold, down the smaller pipes, up the larger pipes and through the return manifold, back to the cooler of the refrigeration plant. Under these conditions, the outer pipes became surrounded by ice cylinders of increasing diameter. These ice cylinders eventually joined, thus forming a solid frozen wall.

When the freezing was started on August 4, 1959, the refrigeration load amounted to 135 tons which decreased in 10 days to 74 tons, in 20 days to 67 tons, in 30 days to 46 tons, in 40 days to 36 tons, in 50 days to 36 tons, in 60 days to 35 tons, in 70 days to 28 tons, in 80 days to 26 tons when the refrigeration load remained fairly constant.



Method of freezing the soil for shaft sinking.

The shaft was frozen solid to the centre at the bottom after freezing 38 days and the ice wall was established in 50 to 52 days. Excavation could have been started 70 days after the freezing was started. However, it was thought desirable to continue the freezing longer, so as to thicken the ice wall and approval to start excavation was given 80 days after starting the freezing, or on October 21, 1959.

In the first 10 days of freezing, the temperature of the brine was lowered from 59° F., which was the ground temperature, to 2° F. in 20 days to 0° in 30 days to –7°, in 40 days to –12°, in 50 days to –14°, in 70 days to –16° and in 80 days to –18° where it remained relatively constant. The temperature differential between the brine entering and the brine leaving the freeze pipes varied from about 3° F. at the start to ¾° F. after 70 days of freezing.

Attempts have been made to develop an emperical formula to express the relation between the brine temperature, the size of the freeze pipes, the amount of brine flow

and the spacing of the freeze pipes in order to establish an ice barrier in a given time. So far no such formula has been developed, probably because not enough information is available about the behaviour of the formations during the freezing. Nor is it known how fast the frozen zone around the freeze pipes develops with a given set-up nor how far it ultimately extends.

It might be mentioned, though, that reliable techniques have been developed to ascertain when an ice barrier has been established of sufficient strength to resist the external forces involved so that the shaft excavation can be carried on safely. Likewise, methods have been developed to relieve the expansion of the formations as the freezing takes place, which would otherwise cause lateral displacement of the formations and heaving at the surface.

The application of freezing to seal off water flows and to solidify unstable formations, has enormous possibilities in the construction field. Various materials, when frozen, develop strengths varying from 300 p.s.i. for pure ice to 1,700 p.s.i. for tightly packed sand. The various materials also have different thermal conductivity and insulating characteristics which must be taken into consideration in the design of a freezing system. Disregard of these factors are the probable causes for some of the failures on projects where freezing has been attempted.

Soil freezing equipment is supplied in the United Kingdom by York Shipley Ltd. of London.

A MODERN FROZEN CHICKEN FACTORY

Two 60 ft. freezing tunnels used in new plant

WITH the recent completion of their £300,000 Aldershot factory and the resultant increase in production, the Buxted Chicken Co. Ltd., is one of the largest firms in Europe producing oven-ready chickens.

The company operates three stations which produce a total of 200,000 birds each week. The Aldershot factory, believed to be the best equipped of its kind in the world, has been planned to allow for considerable expansion, and the floor area, stores and plant rooms are designed accordingly.

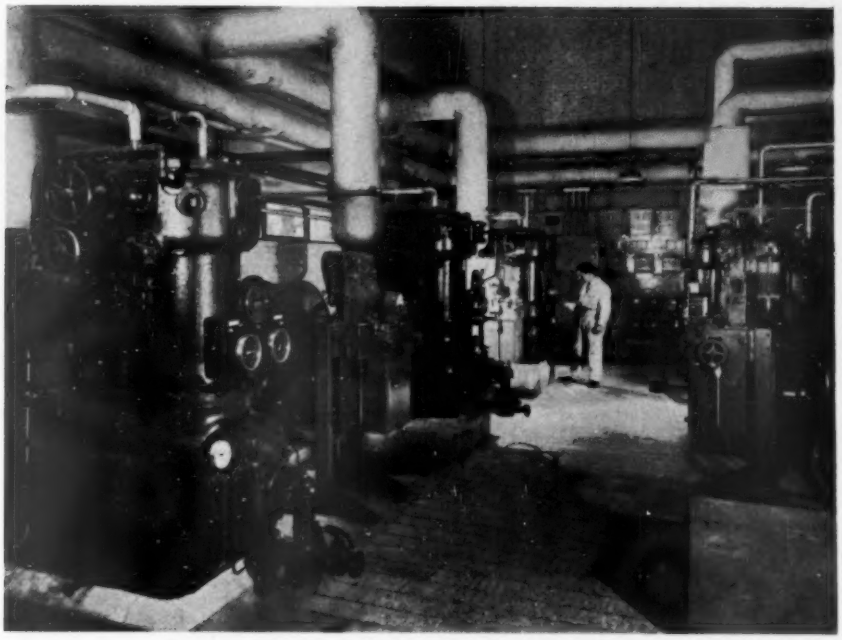
As the birds are received in the unloading bay situated at the extreme end of the building, they are placed on a Johnson-Stephens overhead conveyor. This comprises a single tubular track from which the load bearing frames, linked together by endless chain, are suspended, each frame running on a pair of nylon rollers. This method is found to be hygienic and the components are unaffected by frequent washing down.

Within seconds of being placed on the conveyor the birds are electrically stunned, killed and bled. A dip in the conveyor line immerses them in hot water which assists the removal of feathers during their progress through the automatic plucking plant, after which they pass to the eviscerating section where the insides of the birds are completely cleaned. Giblets are conveyed to another section for wrapping while inedible offal flows away in stainless steel channels.

Before freezing, body heat is removed in chillers. The birds enter at one end and pass inside a rotating drum which thoroughly immerses them in water which is chilled by the addition of flake ice. This ice is produced adjacent to the equipment by York DER 25F automatic icemakers and stored in insulated bins. The icemakers are operated from 10 h.p. Refrigerant-12 compressor units.

Reduced to about 40° F. the birds are passed to the trussing section where the wrapped giblets are inserted. They are then packed in polythene bags from which air is subsequently evacuated, weighed, labelled, and placed on tiered trolleys ready for freezing.

Freezing is carried out by air-blast methods in two tunnels each approximately 60 ft. long. These are



View of the plant room showing high stage and low stage York compressors for the freezing tunnels.

believed to be the largest that have been built for this type of installation. Finned evaporation coils are installed in each tunnel operating on the ammonia pump circulation system, the air being circulated by double inlet fans vee belt driven. Air is delivered to the birds at not higher than minus 40°F., which produces a high grade product and gives economical freezing time.

As the loaded trolleys are fed into the tunnel the operator presses a button which starts up a short conveyor and as the trolley moves along it shunts those already in position, maintaining progress. When any trolley reaches the end of the tunnel a trip is automatically operated and a similar conveyor system projects it forward ready for removal of the birds to the cold store.

The refrigerating equipment for the tunnels was designed by York Shipley Ltd., in consideration of all the company's particular production requirements and future developments, and comprises a two-stage ammonia compression plant, having separate low- and high-stage machines providing flexibility for load variations.

Low-stage compression is produced by three York 15 in. by 10 in. vertical, single-acting, ammonia booster compressors, while two York 9 in. by 9 in. twin-cylinder compressors provide high-stage compression.

After freezing, the birds are packed in cartons and transferred to a store where they are held for a short time at a temperature of minus 5° F. The plant for this duty comprises two York 5 in. by 5 in., twin-cylinder, vertical, single-acting, ammonia compressors.

Condensers, common to freezing tunnel and cold store duties, comprise a battery of York model EV 126A forced draught evaporative type units mounted over a concrete water cooling tank situated outside the plant room.

Loading is carried out through a delivery hatch built in the outside wall. Delivery is made to all parts of the country by the company's own fleet of insulated vehicles.

U. S. AIR-CONDITIONING

Installed cost of central station air-conditioning systems which went into operation in large multi-room buildings and commercial and industrial applications in the U.S. during 1959 is estimated at $715,080,000, compared with $604,130,000 in 1958, the Air-Conditioning and Refrigeration Institute has reported in America.

The ARI figures are based on shipments for use in the United States of compressors, condensing units, absorption systems, and centrifugal and reciprocating liquid-chilling packages of 25 h.p. and over. They do not include any figures for brine chillers or equipment utilizing ammonia as a refrigerant. Actual cost of the equipment included in the base is estimated at about 10 per cent. of the installed value of central station systems. The remainder includes labour, ducts, controls, insulation, plumbing, and other installation costs.

ICE IN HISTORY

● The natural phenomena of ice have fascinated man from his earliest days far back into pre-history ; hail in summer is in striking contrast with the fire of the sun and the many variations of ice formations in nature never cease to interest. Lingering snow in deep pockets in the mountains in regions of hot summers, ice-floes and ponds where ice persists in warming waters, and night frosts in the cold light of stars alternating with days of fiery sun led to conservation of cold for use in heat just as the squirrel conserves his nuts for hungrier days.

● To the inhabitants of the fringe regions over which the Ice Age has advanced and receded the effects of the ice were not only legendary but very real. Less than 200 years ago the people of the island now prominent in fishing disputes were negotiating for abandonment of their homeland and resettlement on the mainland of Europe due to the ice enemy. The wind of change of the late 1700s gave their habitat more tolerable temperatures almost coincidental with the political wind of change engendered by Napoleon, who never recovered from his defeat largely caused by ice on the plains around Borodino.

● Many references to the conservation of snow for use out of season to cool liquors and sherbets occur in writings throughout the ages from the days of Solomon, the Greeks, Romans and Crusaders. Immersion in the liquor was condemned as unhealthful by a court physician in the days of the Emperor Charles V and contemporary with our first Elizabeth it was considered a mark of excessive luxury. From time to time government monopolies in Mediterranean countries provided a fluctuating minor source of revenue. Chemical methods of cooling water and later freezing mixtures of ice and various salts were developed culminating in the dry ice of solid CO_2.

● The benefits of cooling in allaying fever were augmented when either snow or ice were at hand and the commercial development of the New England state of Maine led to export of natural ice from the ponds of this cold corner of what is now the U.S.A. Initially to help combat an epidemic of yellow fever in the Caribbean the natural ice trade developed until it extended to distributing centres at New Orleans, Rio de Janeiro and Calcutta, river ice in winter augmenting the supplies of pond ice for the relief of suffering and the storage of food as well as for central cooling of winebibbers.

● Similarly, a huge pocket of natural ice in the Norwegian mountains, Lake Venner, was exploited for supplies not only to Britain and Europe, but with the aid of fast sailing ships as far as South Africa and the Indian Ocean.

● The remains of ice stores at local distribution points may still be seen, notably at Chiswick near London, where the superstructure is often mistaken for a bus shelter. A multiplicity of air locks with the actual store in conical formation below ground with drains for wastage on melting were salient features. The use of natural ice has lingered in remote parts where manufactured ice is unnecessary or unavailable. The writer of these notes has vivid memories of, when near the Arctic Circle, cutting blocks of river ice which had served as a winter road and storing in a pit in a log cabin. The insulation provided by the earth and the heavy superstructure promised to ensure an ice supply until natural ice came again, but due to dual tenancy others insisted on using the super-structure and not merely the air lock as a cycle store after midsummer. The frequently opened doors caused premature melting of the ice, but for several weeks in the hot arctic summer of perpetual sun bicycles became an article of cold storage, adorned by hoar frost.

● In the arid countries of low day-time humidity, night-time ice making was developed in the open air under cloudless skies. Water in shallow straw-insulated pans was the subject unwittingly of vapour pressure difference which engendered evaporation of water into air, the latent heat of evaporation of the fraction lost being balanced by the cooling and freezing of the remainder.

● The introduction of refrigerating plant, therefore, found for many years an insatiable market for ice-making, and ice distributed from central stations became the handmaid of perishable foods everywhere, from sources throughout the distribution chain into the home, in addition to extension of former uses. Direct refrigeration in individual sets however extensive is but an ally, as well as a producer, of ice, and nothing can replace the ice cube or chip in the glass that cheers. Not yet.

● But what of the future? Stargazing is also accompanied by crystal gazing whether in northern or southern hemisphere for many of the luminous effects in night skies are the result of refraction of light by ice crystals. Tampering with the clouds to make rain and excursions into space have taught us much and will teach increasingly more.

B. C. OLDHAM.

A typical ice delivery man of grandpop's generation—a delightful study, by courtesy of Du Pont de Nemours & Co. (Inc.), Wilmington.

ICE-MAKING

A Review of Modern Equipment for producing the WORLD'S OLDEST REFRIGERANT

LONDON'S LARGEST AND MOST MODERN BLOCK ICE PLANT

THE well-known firm of United Carlo Gatti, Stevenson & Slaters Ltd., the pioneer importers of ice into Great Britain last century, and later one of the original producers with mechanical plant, is still to be found at Parkgate Road, Battersea. In the *Harmsworth Magazine* of 1897, an article appeared entitled " From Lake to Lemon Squash " in which reference was made to the company's activities in this south-western quarter of London.

Discussing the imported ice trade, the writer in the journal quoted above referred to the " enormous development of the ice trade in this country. . . . Since 1888, it has more than doubled. In the former year London imported 102,010 tons and last year the shipments to the metropolis reached 204,490 tons—or nearly half the total ice shipments from Norway . . . this year the amount bids fair to be larger still, and at the time of writing no fewer than 20 ships, full of ice, are lying in the Thames waiting to be unloaded.

" The ice trade of the metropolis is practically in

High quality 3-cwt. blocks being tipped from the cradle at Battersea.

Right: A row of 3-cwt. blocks being harvested at United Carlo Gatti's plant.

Left: Mr. R. A. Guest, general manager, watches the loading of blocks.

Below: One of the modern fleet of 30 vehicles.

the hands of two firms, of which the larger is that of Messrs. Slaters Ltd. . . .

"Most of the ice passes from the ship to the barges moored alongside. Powerful cranes are set to work, ice-dogs grip the slippery masses and the great blocks are rapidly swung into the barges, where they are dexterously stacked and finally covered with tarpaulin. Then the barge goes up with the tide to the ice wharves at Battersea and Westminster. . . ."

It was to Battersea that "M.R.'s" cameraman went last month to depict United Carlo Gatti's operations in this present age.

While most persons imagine that ice-making is a dwindling trade in the face of competition from mechanical refrigeration, it is an indisputable fact that the daily output from the United Carlo's Battersea plant is in excess of 120 tons ; the greater part of this manufacture goes to meet the needs of Billingsgate Fish Market, shipping at Tilbury, London and Southampton Docks and many of London's hospitals, hotels and restaurants, and fishmongers as well as industrial consumers. Amongst the last mentioned are manufacturers of fine chemicals, paints and

sausages, etc. Large quantities of crushed and block ice are also delivered to British Railways for use in restaurant and Pullman cars and for packing insulated freight vans conveying such perishable foodstuffs as meat, fish, fruit and vegetables.

To handle this traffic, the firm operates a fleet of 30 road vehicles engaged in delivering block and crushed ice daily to consumers throughout the Greater London area and in bulk to provincial towns, while some wholesale distributors collect their requirements daily from the firm's Battersea plant. Since the war, up-to-date ice-making plant—including three UDEC compressors of 600 h.p.—has been installed to speed up production and in accordance with improved standards of hygiene, every precaution is taken during production to ensure that the ice is of the highest quality obtainable.

The latest type of sterilizing plant has been installed for producing ice with the lowest possible bacterial count.

The special water-softening equipment, installed by The Permutit Co. Ltd., has already been described in these columns (August, 1959).

An entirely new line of development is being followed by the forward-looking board, headed by Mr. A. Corazza. The company has lately imported the very latest type of ice cubers and ice sizers from the U.S.A. The ice-cuber will break down a standard 336-lb. block of ice into small chips and snow, and this equipment will in early summer be operating at the vining stations in the pea fields of quick-frozen food and canning firms. Top icing will thus be applied to vegetables and fruits on their journey from the growing areas to the packing plants.

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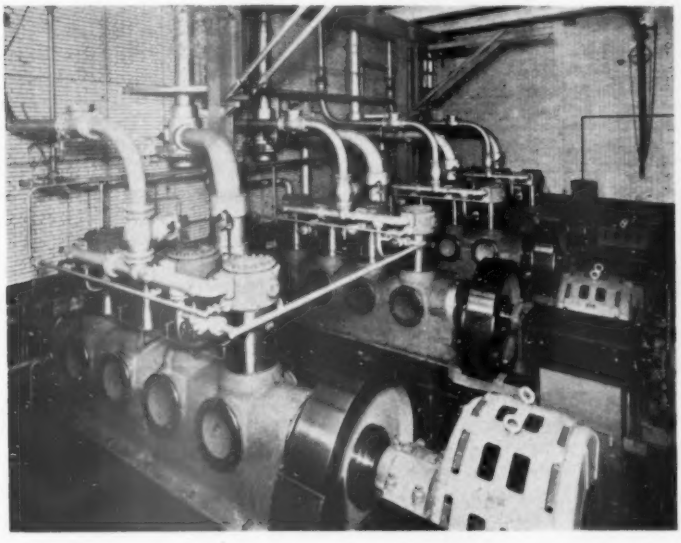
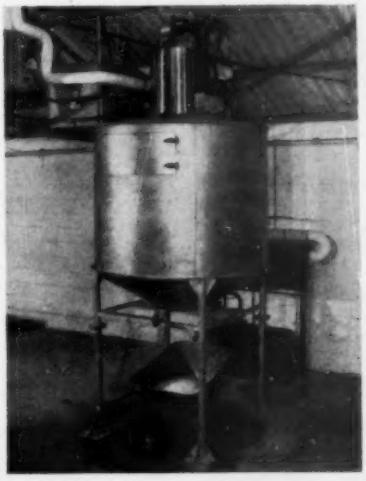
2. MEDIUM SIZE PLANT

THE well-known firm of refrigeration engineers of J. & E. Hall Ltd. have found that in spite of the wide use made of mechanical refrigeration for cold storage, deep freezing, air-conditioning and numerous other uses, there is still a large and expanding demand in the world for ice for packing with perishable goods and a considerable amount is used for cooling transport vehicles and for chemical process work.

Working on the rapid ice system, producing ice from either fresh or sea water, Hall's are manufacturing a most up-to-date method of block production by the process of direct expansion of the refrigerant in a jacket surrounding the mould and in needles which project downwards, so that the centre of the block is frozen as quickly as the outside area.

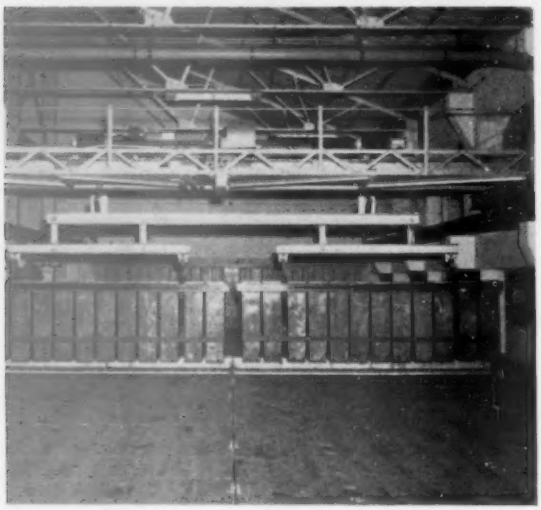
Ice produced in this way is uncontaminated, it is of good consistency and may be opaque or made commercially clear by the introduction of air agitation during freezing. Thawing losses are exceptionally small, as each block leaves the mould immediately it is set free and, therefore, does not lose its valuable sub-cooling or reduce in weight by being over-thawed. As there is no brine used, neither calcium, sodium or other chemicals are required so that the cost of ice production is reduced accordingly. Electricity consumption is low, because no brine agitator or electric crane is required. Since the freezing time of a block of ice is about two hours, the plant is designed to be turned on and off conveniently at any time to enable the plant to be used economically for only a few hours a day if necessary. It is also a relatively simple job to move the plant from one site to another and, if required, can be placed in the open air. In addition





Above: Hallmark flake ice maker with storage bin installed on a turkey farm.

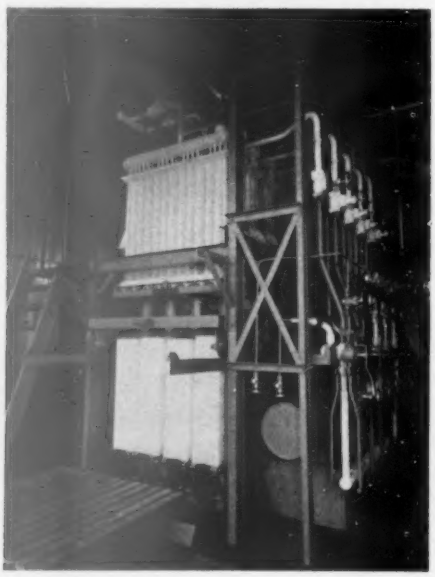
Left: Engine room at the Grimsby Ice Co. showing four of the J. & E. Hall compressors capable of producing approximately 1,300 tons of ice per day.



Ice tanks at the Kingston Ice Co. capable of making 360 tons of ice per day: refrigeration by J. & E. Hall Ltd.

to the production of ice from fresh or sea water, this plant may also be used for bulk freezing milk, fruit juice, puree, chemical mixtures and sludge. A modified design can be used for rail or water transport.

Another recent innovation for ice manufacture is the Hallmark Col-Flake ice plant which is a drum-like plant working on the principle of freezing a uniform flow of water over the inside walls of the freezing drum with a rotor arm carrying blades which scrapes the ice away in flakes, to be collected in storage bins below the plant.



Block ice production by the Rapid-Ice method of which Hall's are the licensees and makers of the patented plant.

For a short period before the ice flakes are discharged, no fresh water is added to the freezing surface, to ensure that the ice flakes are supercooled and dry which prevents it from " packing into a solid mass in the storage bins. "

Col-Flake ice makers are becoming increasingly popular in the poultry industry : for meat and fish preservation : in the chemical industry, bakeries, hotels, restaurants and dairies.

There are numerous ways how flake ice can be used and Hall's are producing units ranging from half a ton to 20 tons per day.

A RANGE of automatic icemaking machinery for all commercial applications is manufactured by York Shipley Limited, North Circular Road, London, N.W.2. Perhaps the best known unit in this category is the model B225 " Icelet " maker which produces up to 220 lb. in 24 hours. It consists of two sections, the upper, ice-making section, and the lower section, an insulated storage bin that forms the base of the machine. The machine is completely self-contained and needs only water and electric supplies together with a drainage connection to the ice bin. Standard electrical supply is 220/240 volts 50 cycle single phase A.C. The dimensions are : height, 77½ in. ; width, 24 in. ; depth, 25 in. ; and working weight 450 lb. Bin storage capacity is 150 lb.

Refrigeration for the B225 comprises a ½ h.p. " Arcton 22 " (" Freon-22 ") Yorkometic hermetically sealed motor compressor unit with a circular air-cooled condenser which is mounted at the top of the machine casing. The stainless steel evaporator, of special design, is arranged to produce icelets in batches of nearly 200 per freezing.

The York Shipley model DEB–2B ice flake machine produces up to 250 lb. of ice per 24 hours in the form of pure, clear crystal ribbon fragments or flakes. It is entirely self-contained and needs only connections for water, electric supply and drain. Standard electrical supply is 220/240 volts, 50 cycle single phase A.C. The dimensions are : height, 32½ in. ; diameter, 24¼ in. ; working weight 245 lb. The machine may be placed on a counter, with storage bin below, or an insulated storage bin can be supplied to suit purchaser's requirements. This machine is also powered by the Yorkometic sealed unit.

For larger applications the model DER25P produces up to 4 tons of ice flakes in 24 hours. This compactly designed unit is specially treated to provide sound isolation. Controls are specially designed for trouble free automatic operation. Units are furnished with a combination refrigerant capillary tube and expansion valve, low pressure control, safety mercury tube switch, and built-in gear motor overload protection. When required, a suction line solenoid value, a suction pressure regulator, and a line thermostat are available.

York ice-maker seen at the new Keirby Hotel, Burnley, last month.

3—SMALL SIZE PLANT

A COMPLETELY new introduction to the Prestcold range of refrigeration equipment, the automatic ice-cube maker can produce up to 1,600 ice cubes in a day with absolutely no effort on the part of the user. All he needs to do is collect the cubes from the storage bin which has front access for easy removal of the cubes by scoop or spoon.

Automatically the cubes drop into the bin as they are made. Once the bin is full to a previously set level, production stops automatically until some of the cubes are taken away. Automatically production starts when cubes are removed until the bin is filled again. The ice-cube maker is connected to a water supply so that as cubes drop into the bin more water flows in automatically to be frozen.

The ice-cube maker is a cabinet designed for installation under counters and a top to match existing counter tops can be made. It can also stand on a counter, or be built into it.

Compact and self-contained the ice-cube maker has an adjustable, magnetic door latch for quick, positive closing.

WITH fully-automatic freezing of running water into crystal-clear cubes which are delivered into a refrigerated chest and stored there until required, highly economic ice making is achieved with the Frigidaire automatic ice cube maker, model CMZ-11. This is the very attractively styled cabinet which was the centre of great interest at the recent Hotel and Catering Exhibition and which has since been installed by a number of hotels and restaurants.

Operating by means of mains water flowing down an inclined evaporator plate, the CMZ-11 ensures perfectly clear ice because of the steady build-up of ice without solids settling. When the ice sheet reaches a pre-determined thickness from ¼ in. to 1 in., it is released from the evaporator and cut into cubes by electrically-heated wire grids. The cubes then fall into the storage chest where controlled temperature and humidity keep them hard without sticking together. They can be scooped out as required and the whole cycle rests while the storage chest remains full.

The CMZ-11 will produce between 5,000 and 10,000 cubes every 24 hours depending on the size of cube.

The Sabroe slush ice making machine, powered by a Frigidaire 5 h.p. water cooled condensing unit, producing ice for poultry freezing.

A very much simpler form of ice cube making, suitable for the small bar or restaurant, is the Frigidaire IFR-15 which is a special cabinet containing a large evaporator designed to hold 10 ice-cube trays each producing 36 cubes per freezing. Immediately below the freezer is a drawer-type bin for storing cubes until required. A shelf is also provided, giving room for storage of other items in the cabinet, such as bottles.

Both the automatic ice-cube maker, model CMZ-11, and the cabinet model IFR-15 are powered by Frigidaire " Meter-Miser " rotary compressors, built integrally.

Ice making on a somewhat larger scale is now becoming popular in large stores, notably supermarkets. The more enterprising of these find it useful —and profitable—to install an ice-block maker as part of their refrigeration plant and to use the crushed ice for two purposes. In the first instance ice chips are used to cool wet fish in display cabinets and on display

Frigidaire ice cube maker.

slabs and, secondly, packs of ice are sold to customers for domestic purposes.

A typical installation is that at the John Gardner Supermarket in Kensington High Street, where an Eldwood cabinet with Frigidaire refrigeration is producing 5 cwt. of block ice a day for crushing.

Frigidaire's model CMZ-11.

Special equipment for similar purposes can be designed as required by refrigeration engineers, employing, for instance, a ¾-h.p. Frigidaire condensing unit for 3 cwt. ice capacity or a 1½-h.p. unit for a system giving up to 6 cwt. per day.

Slush, or flake, ice—a mixture of ice and water at 32° F.—is used in large quantities for rapid cooling of a product which is unharmed by moisture, such as fish or freshly-killed poultry, where it is important to bring the temperature down as quickly as possible. Using this method is one of the largest and most modern poultry packing stations in Britain, that of Peak Poultry (Packers) Ltd., at Whaley Bridge, near Stockport, which produces 500,000 broiler chickens a year. A Sabroe slush-ice-making machine produces the cooling material by passing water over an evaporator and allowing flakes of ice to fall to a trough at the bottom of the tower. The machine runs continuously producing 220 lb. of ice per hour and is powered by a Frigidaire 5-h.p. water-cooled condensing unit.

* * *

The latest automatic Crystal Tips ice makers are being used by leaders of the catering industry ; hotels, restaurants, clubs, hospitals and laboratories are some of the many users who appreciate regular size ice cubes that are crystal clear, pure, hygienic, easy to handle, and with proven economy in operation.

Three sizes of " ice cubers " are available, each machine being " tailor made " for many varied requirements by Auto-Ice Limited:—

Models B500 (large), B200 (medium)

Either tips or chips are produced by the flick of a switch. B500 produces up to 450 lb. and B200 up to 140 lb. of crystal-clear ice every 24 hours, at ambient air temperature of 60° F.

Model A12.

A new automatic flake-ice machine producing up to 100 lb. " bits " flake ice per 24 hours at the ambient temperature already mentioned. This ice-cycle design freezes water in the ice-making chamber instantly. Other sizes are available freezing up to 320 lb. ice per 24 hours.

" Crystal Cooler "-insulated containers, which will hold ice for 12 hours approximately, are available.

COLD STORAGE in LONDON

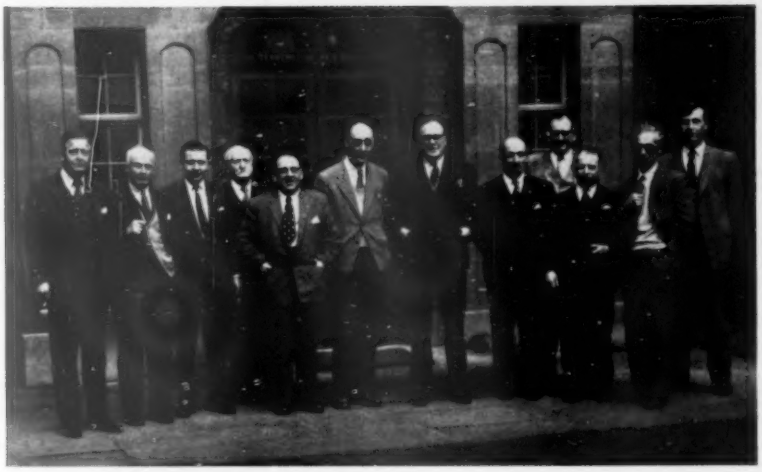
EXTENSIVE SUB-ZERO SPACE FOR ALL FROZEN FOODS . . .

EXCELLENT HANDLING FACILITIES QUICK TURN ROUND OF VEHICLES

UNITED CARLO GATTI, STEVENSON & SLATERS LTD

35 Parkgate Road, London, S.W.11 Tel. Battersea 0072–5

FROZEN FOOD STORE OWNERS AT CAMBRIDGE



On the occasion of the annual meeting of the Association of Frozen Food Stores, a visit was paid by members and visitors to the Low Temperature Research Station at Cambridge. Dr. R. Gane of the L.T.R.S. was guest of the Association at the luncheon and later escorted the party round the laboratory. In this "M.R." picture can be seen, left to right, Messrs. Davis, Major-Lucas, who is the new chairman, Guest a visitor, Ferguson, Dr. Gane, Bonnett, Battley, Newington, Whitehead, Hooper and Newington, Jnr. Messrs. Serjeant and Wagstaffe, who attended, were not in this picture.

ON SHANKS'S PONY TO GLOUCESTER

Leaving London on Thursday, April 1, 10 men, members of the staff of T. Wall & Sons (Ice Cream) Limited, arrived in Gloucester on Friday evening having walked the 100 miles from London. The idea of making the walk was born when Mr. David Bush, a quality control expert, and Mr. Raj Roy, a bacteriologist, were appointed to the staff of the company's new factory at Gloucester. They decided to make the journey on foot and were soon joined by eight of their colleagues.

CHANGE OF ADDRESS

With effect from April 11, Walter Cassey Limited, the refrigeration hardware suppliers, have changed their address. All communications should now be made to 141, Pleck Road, Walsall, Staffs (telephone : Walsall 5438).

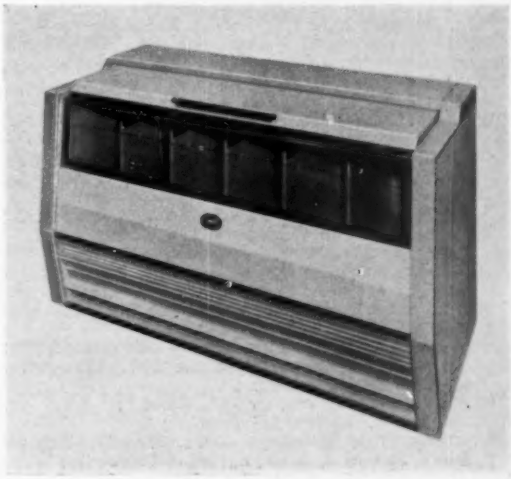
EXPORT OPPORTUNITY

Boror Comercial, Caixa Postal 1185, Beira, Portuguese East Africa, inform us that they would be interested in acquiring the agency for Mozambique of a range of top quality refrigerators of U.K. manufacture. They would also be pleased to hear from manufacturers of components in the refrigeration and air-conditioning fields.

FAN FOR DISPLAY CABINETS

A new version of their successful "Wafter" fan unit, which can be used in refrigeration display cabinets and also dairies, kitchens, larders and many other confined spaces, is now being produced by Plannair Limited. The new "Wafter" moves 50 c.f.m. of air under free intake and discharge conditions, and its silent running 2,600 r.p.m. motor has a power consumption of only 12 watts. Total weight is less than one pound and the over-all diameter only 3½ in.

MARCO'S NEW CALIFORNIAN FROZEN FOOD CASE



The IWO Factory in Sweden

"IWO" does *not* mean "international world organization" said Mr. J. H. Fransson, managing director of Elektro IWO Aktiebolag of Mariestad, Sweden, when he welcomed 32 refrigeration distributors and one editor from the U.K. and Jersey in the head offices recently. Seeing that the firm now has dealers in Switzerland, Austria, Belgium, Holland, Denmark, Norway, Finland, and, of course, in Sweden and the U.K., this denial by the head of the firm was understandable. A large office is maintained in Frankfurt.

Those who undertook this most pleasant voyage were Messrs :—

A. L. Bannister, Ernest West & Beynon Ltd., Bromley ;
T. C. Batson, Alwyn Isherwood (Refrigeration) Ltd., Leeds and Sheffield ;
P. D. Beaver, Bisson Radio Co., St. Helier, Jersey ;
E. E. Brown, The Midland Dynamo Co. Ltd., Leicester ;
R. D. Clephane, John Clephane & Sons, Edinburgh ;
J. A. Collins, Somerset Refrigeration Co. Ltd., Taunton ;
C. L. H. Darley, M. L. Winsor & Co. Ltd., who led the party ;
G. Douglas, Crowther & Shaw Ltd., Huddersfield ;
J. J. Driver, Robert Williams & Co., Hove ;
F. J. Ford, Hartford Electric Co. Maidstone ;
K. F. Ford, Hartford Electric Co. Canterbury ;
G. P. Gill, The Midland Dynamo Co. Ltd., Leicester ;
E. Gosling, Fresco Refrigeration, Stockport ;
E. H. Harrison, Brand's Refrigeration Ltd., Plymouth ;
F. Haskins, Refrigerator Services Ltd., Bournemouth ;
S. L. Jackson, Robert Williams & Co. Hove ;
V. C. King, East Midland Refrigeration, Sleaford ;
G. F. Leech, Mann Egerton & Co. Ltd., Norwich ;
Mr. Lenihan, Frostaire Refrigeration Co. Ltd., London ;
H. W. Milner, Cheltenham Refrigeration Co. Ltd., Cheltenham;
T. J. Packer, Packer & Craven, Spalding ;
G. J. Parker, E. W. Jones (Electrical) Ltd., Shrewsbury ;
C. B. Pitts, Kelvin Refrigeration Co. Ltd., Glasgow ;
R. Radford, Kenyon, Swansea ;
J. H. Rattenbury, MacWhirter Ltd., Cardiff ;
T. A. Raymond, *Modern Refrigeration* ;
P. E. Risby, Risby Refrigeration Co. Ltd., Newbury ;
P. F. Smith, Stevens & Smith, Epping & Colchester;
F. W. Stanley and M. Stanley, Stanley Refrigeration Ltd., Birmingham ;
F. Stevens, Stevens & Smith, Epping & Colchester ;
K. B. Watkins, East Midland Refrigeration, Sleaford ;
G. B. Williams MacWhirter Ltd., Cardiff ;
H. W. Wilson, M. L. Winsor & Co. Ltd. ;
J. G. Wright, H. J. & A. Wright Ltd., Great Missenden.

Apart from the established lines of manufacture—refrigerated and sub-zero shop display cases—IWO have in hand the forthcoming production of milk coolers and ice cubers. The output of home freezers in Sweden is now approaching the "sensational" mark for every third home is now fitted with this modern aid to catering. The private food bill in that country is a large one, for the average householder spends one-quarter of his income on food. Another feature of the Swedish way of commercial life is the existence of merchants service companies who provide retailers with every possible requisite for their shops ; in fact, the motto of one such company is "Hand us the key and we will give you a shop" (fully equipped). These four merchants groups handle a vast amount of refrigeration equipment.

A tour of the IWO factory in the small town of Mariestad, north east of Gothenburg, revealed an almost complete reliance on accessories and equipment made within the factory, a policy away from which so many makers seem to be veering these days. Plastics lamination was a case in point and the whole process of production of a "Formica"-type material was here carried through. It was noticed that forced air flow and automatic defrost are now "musts" in Sweden.

Mr. Fransson, Miss Fransson (Mrs. Fransson was unfortunately not well) Mr. Carlsson and Mrs. Hellstroem helped to make the delightfully informal and pleasant visit so outstanding an occasion.

The Institute of Refrigeration Bulletin

Institute Headquarters: New Bridge Street House, New Bridge St., London, E.C.4 (CENtral 4694)

MEMBERSHIP

At the meeting of members held on March 3, 1960, the following were elected to membership of the Institute :—

Member

*Wertheim, Reinhold, A. P., 19 Woodstock Avenue, London, N.W.11.

* Transfer from Associate Member.

Associate Members

Longman, Cecil Walter Frederick, 156 Cumnor Hill, Cumnor, Oxford.

Maguire, William Mitchell, 119 Kings Lane, Bebington, Cheshire.

*Vandome, Walter John, 690 Pinner Road, Pinner, Middlesex.

Wong, Chun Fai, 42 Brandram Road, Lewisham, London, S.E.13.

* Transfer from Graduate.

Associates

Barker, Kevan Allan James, 89 Talbot Road, Launceston, Tasmania, Australia.

*Calvert, Graham Herbert, 161 Chaplin Road, Wembley, Middlesex.

Cox, John Alfred, 3 Behdemeer Road, Putney, London, S.W.15.

Crowe, Norman Charles, 121 Halton Road, Sutton Coldfield, Warwickshire.

Rothwell, Sidney Harold, 19 Oakhill Road, Orpington, Kent.

* Transfer from Graduate.

Graduates

Clarke, Malcolm Edwin, 166 Howard Street, Cowley, Oxford.

Cooper, Peter John, 24 Singapore Drive, Brompton, Gillingham, Kent.

Mukherje, Rupendu, Ilmington, Crescent Road, Darlaston, South Staffs.

Vasudev, Girish Ramakant, 1 Ornan Road, Haverstock Hill, London, N.W.3.

Institute Prizes

At the meeting of the Institute held on April 7, 1960, the president, Commander W. R. Sinclair, presented the prizes awarded by the Institute for work on the 1958–9 Refrigeration Diploma Course at the National College for Heating, Ventilating, Refrigeration and Fan Engineering..

The winner of the first prize was Mr. K. G. Gillard, who chose the book "Refrigeration and Air-Conditioning and Cold Storage" by Gunther. The second prize went to Mr. T. N. G. Perry and his choice was "Basic Refrigeration—Principles, Practice and Operation" by King and "Thermal Insulation of Structures" by Yate Pitts.

NEW H.V.R.A. LABORATORIES

The new laboratories of the Heating and Ventilating Research Association were officially opened at Bracknell, Berks, on April 6, by the Minister of Science, Lord Hailsham.

In the course of his speech, the minister made reference to the association's history and work.

"Founded as a Research Council in 1955, it became a fully-fledged Association in July, 1959. It serves heating and ventilating contracting firms, consulting engineers and manufacturers of equipment. It also serves some of the most important users of the equipment who include departments of the Central Government, local authorities, nationalized industry and industrial undertakings. Its present membership is 270. I hope as its excellent work becomes better known this will steadily increase.

"To-day we are celebrating the opening of its fine new home laboratory after four years in which it has been accepting—on suitable financial terms—the hospitality at Leatherhead of the British Coal Utilization Research Council. This closer association with a large and well-established research association was particularly helpful during the early years and enabled a quick start to be made in the research programme.

"The programme of the Association is designed to meet both present-day and long-term needs of the member firms. Immediate problems which are being studied, I am told, include an investigation of intermittent heating of buildings and a study of noise produced both in ventilating duct-work and in hot-water heating systems."

CONFERENCE ON FRUIT STORES

(continued from April issue)

AN all-day meeting of The Institute of Refrigeration on the construction of cold stores for fruit was held at Ditton Laboratory, Larkfield, Kent, on Wednesday, March 16, 1960.

Type of Storage

" Before deciding on the type of storage required it is well to consider a number of factors which have a bearing on this," said Mr. E. S. Green.

" Generally speaking storage is required for—

(1) Avoiding gluts by spreading the time when fruit in prime condition can be marketed.

(2) If fruit is conveyed straight from the orchard to the store during the comparatively short period of harvesting there will be more labour and time for proper packing and display for marketing when it is removed from store at a more gradual rate.

" When considering the type of store and plant best suited to the particular requirements of a farmer or packing station it is obvious it must be known what type and variety of fruit is to be stored, and from this information it is possible to decide whether cold storage, gas storage or controlled atmosphere storage is desirable, or whether there should be a mixture of all three. The weight of his crop, or perhaps I should say the expected size, now and in the immediate future must also be known, and what percentage of this will be worth storing both from the point of view of quality and marketing. In addition the expected rate of loading into store must be established.

" A 50-ton or 100-ton store will in one case be loaded in, say, 10 days and in another in less than one day, and the effect of this rate of loading on plant design is referred to later.

" Should it be found there will be several varieties of hard fruit to be stored it will probably be found desirable to have a separate store for each variety as in many instances it has been proved that with two varieties in one store one variety will quite seriously affect the keeping qualities of the other. On the other hand, there are a number of varieties which can be stored together providing the stores temperatures and atmospheres are compatible, also that they will be gathered at the same time. It is not desirable partially to load a store with one variety and cool that down, and then some weeks later add a further load of warm fruit.

" The rate at which a store will be unloaded will not matter in the case of cold storage. With a gas store it must be remembered that men cannot, with comfort, tolerate 8 per cent. of CO_2, but the removal of the gas-tight doors will in a very few minutes give sufficient ventilation to make the store workable.

Plant Capacity

" During the cooling down process of a store full of fruit the following variations have to be taken into account :

(1) Heat ingress through the insulation into the store increases as the store temperature is lowered.

(2) The heat generated by the fruit itself decreases as its temperature falls.

(3) As the fruit temperature and store temperature fall the ability of the cooler and plant to remove heat is declining.

" In addition to these three variations there is the constant one of the heat given off by the air circulating fan.

" A more complicated condition arises where the installation consists of say 10 stores cooled by individual coolers in each store supplied by a circulation of cold brine from a central plant. To simplify the example I have assumed each store is loaded in one day, a total of 10 days, with no allowance for weekends, and that each and every apple must be down to storage temperature in not more than five days. Whether the plant be controlled automatically or by hand a low limit must be set for the brine temperature to avoid freezing the fruit in the vicinity of the cooler. This, therefore, limits the rate at which the first and subsequent stores can be cooled. The problem then develops into one of finding the plant size required to cope with the peak load. As in the previous example each store is considered separately and these duties in B.t.u. per hour are then integrated to show where the maximum occurs.

" I have spoken of an individual store, and of a group of 10 stores with a brine system, and the question quite naturally arises as to when individual plants operating on the direct expansion system should be used and when should the brine system be employed. This is a matter upon which it is quite impossible to be dogmatic, particularly when we are now being advised to store some fruits—particularly pears—at temperatures as low as 29° F. and some varieties of apples at temperatures as high as 39° to 40° F.

" An alternative system which I could not recommend is to have a direct expansion system working on more than one store. Several difficulties arise here which the refrigerating engineer will realise, and they might form an interesting part of the discussion which will follow.

" It must be borne in mind that these plants should be kept as simple as possible although farmers these days do employ very well qualified engineers.

" The best I can do to help anyone to come to a decision is to list the various aspects to be considered.

(1) Capital cost for central plant and a secondary refrigerant circulation is cheaper for an installation storing more than, say, 25,000 bushels.

(2) With a central plant cooling brine there are less moving parts to wear out and on the whole the plant will last longer and will call for less servicing.

(3) A separate plant on each individual store permits greater flexibility of temperature as the temperature in one store is quite independent of that in another.

(4) Power consumption is not of vital importance and is probably in favour of the individual direct expansion plant although the individual efficiency of the small compressor will be lower than the larger ones on the central plant.

(5) Humidity conditions in a group of stores cooled by a central brine plant will be the better, as the brine temperature can be adjusted to approach quite close to that of the store as the brine is left running continuously and cooling is continuous with little desiccation. With the individual direct expansion plant on each store, cooling is intermittent and the temperature difference between the store and the cooler surface must be greater than with brine plant, to match up to the compressor capacity.

(6) Automatic control of temperature can be applied to either type of plant.

(7) Reliability is good with either system and service will be good in either case, in fact it *must* be good, as it must be remembered the result of the farmer's year's work is in these stores.

Cooling System

" Turning now to the actual cooling system within the stores it is established practice to have forced air circulation, and many of the early stores were so fitted although some worked quite successfully with banks of cooling grids suspended from the ceiling and possibly on the walls, these being used in the days when electric power was not available on the farm for driving fans and when rapid cooling was not considered essential. As the atmosphere in one gas store or controlled atmosphere store should not mix with that of another, individual cooling systems in each store are essential and there are two types of coolers in general use, floor mounted and ceiling mounted. In both cases air is drawn from the store, cooled in passing over the cooler, and discharged at ceiling level above the fruit, and here I would add a word of warning against over-filling the store by stacking too high and preventing proper distribution of air over the fruit. The cooled air descends through the stack of fruit boxes into which it percolates and returns to the cooler. To my mind the cooler arrangement which has its air inlet at floor level must provide a better circulation than the arrangement with the ceiling mounted cooler with its air inlet at near ceiling level.

" With floor mounted coolers the bottom boxes of fruit must be stacked well off the floor to allow adequate space for the air to return to the cooler.

" With ceiling mounted coolers the fruit stacked in close proximity to the cooler is less able to get a good air circulation than the fruit which is stacked well away from it, and it has been known to find pockets of warm fruit in this vicinity.

" Whereas in the past floor mounted coolers were generally placed in the centre of the store with the object of giving the most even circulation possible, and when so placed were of little hindrance to hand stacking, the advent of pallet loading and the use of electric stacking trucks has made it desirable to place them against one wall and modify the air distribution arrangement and the results have been entirely satisfactory.

" The coolers and the air circulation should be designed to comply with the cooling rates referred to previously and must be designed to effect minimum dehydration. They must therefore have ample cooling surface for which reason extended surface coolers are frequently used and the air circulation must be vigorous to ensure a small cooling range.

" I believe the personnel of Ditton Laboratory do from time to time quote figures for the surfaces of coolers for various sizes of stores. While I do not believe they intend these to be minimum figures the recipient of such a figure often looks upon it in that light. They are no doubt the best possible but I am wondering if I could ask them to extend their advice to give a range of figures as there should be a relation between cooler surface and plant size, and leave ability for the plant designer to devise ways and means of giving the best results for minimum cost.

" With a direct expansion plant with one compressor on one store it is possible to go too far with the amount of cooler surface included to such an extent that the thermostatic regulator is unable to allow this surface to be used effectively, with the result that a large amount of cooler surface for which the farmer has paid is not doing any good at all.

" Earlier I mentioned automatic control of temperature; perhaps I should have said automation. Whatever the name, the store temperature can be controlled automatically although it is the fruit temperature which should be controlled. The operating range of the thermostat must be small—of the order of 1½° to 2° F. in the case of apples stored at 38° to 48° F. and under 1½° F. for pears stores at 29° F.

" For apple storage a single thermostat will suffice with the sensing element kept away from the air discharge from the cooler, or short cycling will occur.

" In the case of pear storage the problem is a little more difficult as the air discharge temperature from the cooler will be very near to freezing point of the fruit. It is therefore advisable to have a second thermostat arranged with its sensing element in the air being discharged from the cooler and this second thermostat must override the first one and shut down the plant if the air temperature being discharged from the cooler gets below the freezing point of the fruit itself.

" Hand control can be very effective, with fruit temperatures kept within about 1° F. This close control is made easier than in stores used for general commodities as the bulk of fruit in store is larger and the cooling rate under storage conditions is only of the order of 1° F. for every five of six hours the plant is operating. Even this slow rate of cooling and conversely rise in temperature does not allow the farmer to go away for the weekend and leave his hand controlled store unless he has a reliable man he can leave in charge.

" However well a cooling system is designed there must be a difference in temperature throughout the store while the plant is running for the very simple reason that to effect cooling the air discharged into the store must be colder than the air drawn into the cooler from the store. This difference, although slight, should be eliminated and partly with this purpose in mind the user is recommended to leave the air circulating fans running continuously. Another distinct advantage from so doing is that air movement amongst the fruit prevents local accumulation of gases given off by the fruit which might cause local deterioration. The disadvantage of keeping fans running all the time is the heat they give off and this in turn has to be removed by the refrigerating plant. A distinct improvement is obtained if two-speed fans are used and run at full speed when full cooling is required or when the refrigerating plant is in operation if it is an individual plant on each store, and at half speed when the plant is not running or if the cooler is fed with brine at a relatively high temperature during holding conditions. By this means the power taken by the fans and therefore the heat generated is reduced to about 30 per cent. of the heat generated when running at full speed. The saving in power consumption pays for the extra cost of the fans in a few years.

" The use of two-speed fans has a further advantage of a nature which is more difficult to assess with accuracy and is related to relative humidity in the store, and as this subject is one which has already been dealt with by a synopsis of papers I cannot hope to deal with it here and must therefore leave it with the bald statement that relative humidity is lowered by the heat given off by the fans.

" A quicker evening out of temperature, immediately after the plant has shut down, will be effected if the fans are arranged so that the air flow can be reversed.

" This subject of relative humidity and its effect upon loss in weight from the fruit is a highly complex one. I believe calculations and theoretical work do not always give us a complete picture and I find it difficult to decide whether it is advisable to cool a store during the holding period by running the plant for a long time with a small temperature difference between the store temperature and cooler surface, or whether it is better to run for half the time extracting double the amount of heat with a smaller cooler and a bigger temperature difference. I am inclined to favour the latter.

In his paper " The Construction of Controlled Atmosphere Stores," Mr. A. C. Murdoch, stated : " Although a simple air-conditioned store is suitable for a few varieties and certain storage period requirements, the controlled atmosphere store offers versatility for little extra initial cost. Some varieties can be stored in an atmosphere, the balance of which does not require the use of a scrubber (*i.e.* the total of oxygen and carbon dioxide is 21 per cent.) but it is well to so design the store that a scrubber can be added even though it may not be included in the initial installation. This promises full flexibility as new storage recommendations are developed by the biologists.

" Temperatures in use range from 30° to 40° F. with the emphasis on the higher end of this range for apple stores and at the lower end for pear stores. Relative humidities at present favoured are of the order of 85 per cent. or a little over.

" Wilting becomes serious if the humidity is much lower and mould growth has been thought to be a problem if humidity is much higher. However, work is being done which suggests that the carbon dioxide and low oxygen in the store inhibit mould growth and successful storage in humidities in the range 92 to 94 per cent. may be possible.

Store Layout

" Many factors determine the size and layout for an apple store.

(1) The size of the store will be related to the picking and loading potential of the farm. The store should be loaded in not more than five days and the fruit brought down to its final storage temperature in four to six days from the completion of loading.

(2) The size of the store must be related to the marketing potential at the end of the storage period as, once a

store is opened, it must be completely unloaded and cannot normally be resealed with a part load for the continuation of storage.

(3) It is an advantage in terms of initial cost to use standard types of machinery in which the individual components are of a weight and size not calling for any special handling tackle at the often difficult sites on the farm.

" These factors combine to demonstrate the reason for the great popularity of the 50-ton (2,500-bushel) store. Such a store will be about 20 ft. by 20 ft. by 14 ft. high, the latter figure being near to the practicable maximum for simple stackers.

" Pallet loading requires a store of somewhat greater size than for direct box loading ; for instance a store capable of holding 2,100 bushel boxes on pallets would accept 2,700 bushel boxes, if hand-loaded. With mechanical loading, space must be allowed between the stacks for manoeuvring the mechanical loader.

The increasing use of mechanical and pallet loading is causing the disappearance of the one time popular centre stack cooling unit and although this, without doubt, offers the best air distribution within a loaded store, equally satisfactory performance can be obtained from other types of cooler which have the advantage of leaving the floor completely clear for stacking.

The Store Structure

Outer Structure

" The principal requirement in the outer structure is rigidity. The maintenance of two sealing membranes, firstly a vapour seal at the outer skin of the insulation and secondly the gas seal forming the inner store wall, is dependent on the stability of the structure.

" Brick or concrete blocks or other conventional building materials are quite successful and often it is worth considering an existing structure provided that it is rigid and its inner surface is sealable and forms a ready surface against which insulation can be erected.

" In view of the relatively large flat surfaces cavity exterior walls merit serious consideration if a new building is being erected. A damp wall will in due course cause the vapour seal membrane to detach itself and even bring the insulation down with it. This is a second justification for cavity walls and special methods of protection against water on badly exposed walls.

" A rigid ceiling structure is needed to sustain the two seals and in assessing the size of bearers, which may involve spans of 20 ft. or more, the possibility of working on or stacking on the top of the room must not be neglected.

Inner Structure

" This is the gas containing membrane and it must be highly impervious to carbon dioxide. Carbon dioxide is an extremely fugitive gas and, therefore, to ensure freedom from gas leakage a high standard of design and workmanship is required.

" Most of the early apple stores were lined with galvanized steel sheets set on wooden bearers, the sheets being overlapped and the joints sealed with petroleum jelly. This type of lining has gone out of favour in recent years because of the difficulty of repairing faults in the grease seal without very extensive stripping down of the room and because of the rotting of timber grounds. Admittedly, this last factor is a criticism of the outer vapour seal rather than of the gas seal but it is a real hazard factor in the application of metal sheet gas linings.

" Despite the disadvantages of metal sheets for the general lining of the store, they are still worth while for ceiling linings. A metal lined ceiling is better able to survive on a springy structure than is a rendered ceiling.

" Current practice for walls is to use a rendering of water-dispersed bitumen for the lining, associating this with solid slab insulation such as cork-board or expanded polystyrene board.

" Recent developments showing promise are in the use of linings of polyvinyl chloride either sprayed on to the insulation board or as a sheet lining attached to the insulation and sealed with a p.v.c. adhesive. This material is tough and has a certain degree of flexibility and is expected in time to compete with the conventional bitumen lining.

" There are a number of proprietary bitumen rendering compounds in successful service in controlled atmosphere stores and with these experience has shown the necessity for a range of compounds for use at different points in the store. The most satisfactory treatment for the large flat surfaces is double rendering with each coat approximately $\frac{1}{16}$ in. thick. As there is a shrinkage of the order of 40 per cent. in these materials on drying, satisfactory results can only be expected if adequate time is given for each coat to dry out before the next is applied.

" The yardstick of compressor horsepower, so frequently used, is not altogether satisfactory when considering the equipment for a store, and it is more appropriate to refer to B.t.u. per hour or to tons refrigeration (12,000 B.t.u. per hour) at suitable evaporator and ambient temperature conditions.

" In order that the air may pick up heat from the fruit it must be possible for it to pass through the fruit stack and between the sides of the stack and the walls of the store, for which purpose a gap of an inch or so should be left. The return of air across the floor is taken care of by setting the bottom layer of boxes on battens or short concrete piers.

" Pallet loading, although limiting to some extent the capacity of a room, can improve the air distribution and the quality of the storage.

" Air velocities greater than 60 ft. per minute on the fruit could cause wilting, and it is important to keep air velocities in the vicinity of the fruit below this limit. This consideration of acceptable air velocity limits the maximum rate of air circulation to about 40 changes of air per hour based on the volume of the empty store. For the 6,000 c.ft., 50-ton store a total air flow of about 4,000 c.ft. per minute meets this requirement.

" The automatic control of temperature is best achieved by a straightforward on/off thermostatic switch high in the room and out of a direct air stream.

" With the typical equipment rating of 24,000 B.t.u. per hour the air temperature change is $5\frac{1}{2}$° F. total or about 4° F. in passing through the fruit stack. During the early part of the holding period, equipment with this rating may only be running for 8 to 10 hours per day, and as the air circulation is continuous, the effective temperature difference in the stack need be no more than $1\frac{1}{2}$° to 2° F.

" As has been described in the section on store layout, air is drawn from under the stack into a vertical duct in the centre of one of the store walls, and the fan and evaporator located in this duct. The air is distributed by shallow overhead trunking with a number of side outlets along the length. The outlets distribute the air at the ceiling within a space of a little less than one box height across each half-width of the store, say 10 ft. An outlet air velocity of the order of 500 ft. per minute is sufficient to ensure uniform distribution of the cooled air.

" The table shows the depression of the dew point associated with various relative humidity levels at a typical store dry-bulb temperature of 38°F.

38° F. Dry-Bulb Temperature

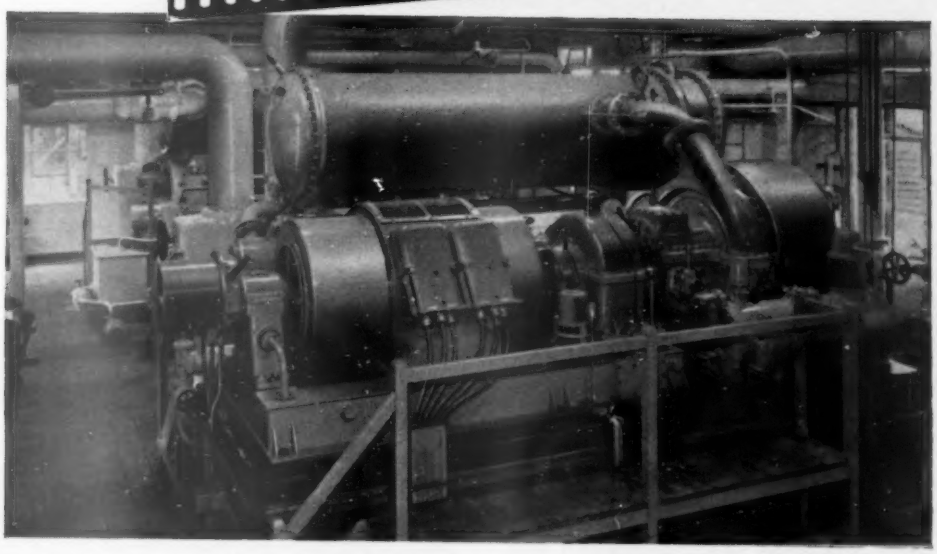
Relative Humidity	*Dew Point* °F.	*Dew Point Depression* °F.
100 per cent.	38	—
95 per cent.	36·8	1·2
90 per cent.	35·3	2·7
85 per cent.	33·8	4·2
80 per cent.	32·3	5·7

" The demand for high humidity in the store must be met by maintaining the refrigerant temperature in the evaporator close to the store air temperature, a difference of 5° to 6° F. being acceptable. For a store at 38° F. this represents an apparatus dew-point of 32° to 33° F. Due to the by-pass effect of air in the evaporator the actual air dew-point will be a little above this, say, 35° F. showing about 90 per cent. relative humidity of air delivered to the stack.

" A typical coil for a 50-ton store will have approximately 10 sq. ft. of frontal area with heat transfer surface on the air side of about 17 sq. ft. per bank per sq. ft. of frontal area. This coil in a five-bank formation will have a rating of the order of 3,900 B.t.u. per hour per °F. and a temperature difference between refrigerant and air of 6° F. at 2-ton rating," concluded Mr. Murdoch.

Sets of these papers are still available at 5 shillings.

1,350 TONS of REFRIGERATION for KODAK Ltd.



The illustration shows one of the three CENTRIFUGAL REFRIGERATING MACHINES supplied and installed by J. & E. Hall for the Harrow (Middlesex) Works of Kodak Ltd. They are used for controlling temperature and humidity during the processing of their products. With a total b.h.p. of 2150, the machines have an output of 16,200,000 B.t.u./h—equivalent to 1,350 tons of refrigeration!

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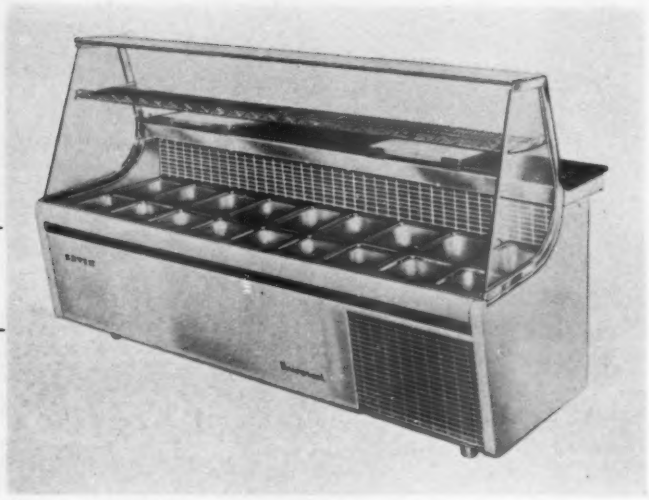
AP 378

LEVIN CAMPAIGN IN U.K.



K. J. Levin (AB) of Malmo, Sweden, open a new sales campaign in Great Britain with display at the Self Service and Shop Equipment Exhibition at Olympia from May 23 to May 27. Their stand number 31 on the ground floor of the Empire Hall, will display the Frys-o-Matic 227/F, Top Frys 125/I, Kyl-o-Matic Parad 121/F, Universal 120/I, Kyl-o-Matic Gondol 121/F, Kyl-o-Matic 327/F, Frys-o-Matic 136/F. The stand will be staffed by Levin's London area agents, Bland Bros. (Electrical) Ltd. of Richmond, Surrey.

Coinciding with Unilever's recent announcement of a £7 million development programme which spotlights the vast expansion of the frozen food industry, Levin's sales director, Mr. Hugo Henriz, has just made a flying tour of Great Britain confirming the appointments of seventeen main agents covering England, Scotland, Wales and Northern Ireland and setting up a London sales bureau. The appointment of a sales manager for Great Britain will be announced by Mr. Henriz on his return to England in the middle of May to attend the Self Service and Shop Equipment Exhibition and it is intended that the United Kingdom office will be in full operation shortly after.

M.R. in S.A.

Subscription orders for this journal can be placed with any branch of the Central News Agency Limited in South Africa and Kingstons Limited of Rhodesia, or direct with the Federal Overseas Subscription Department, P.O. Box 10799, Johannesburg.

An order for twelve direct induction plate freezers and ancillary refrigeration equipment for China, has been obtained in the face of strong competition from other British and continental firms by the G. Williams Engineering Company Limited, Mission Works, Disraeli Road, Willesden, London, N.W.10.

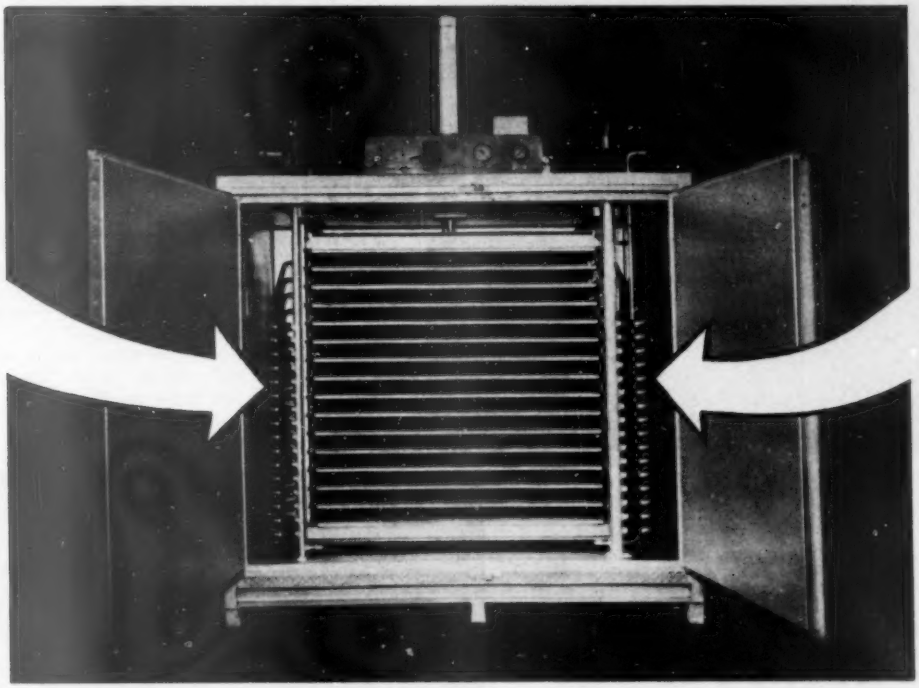
MODERN ELECTRIC EXHIBITION

AN exhibition of refrigerators and display cabinets, for traders in the Berkshire area, was held at the Roundabout Hotel, Reading, on April 30 and May 1, by the Modern Electric Company, The Colonnade, Maidenhead. Considerable interest was taken in the event and a wide range of units was shown.

The managing director of Modern Electric presents a frozen turkey to the winner of the competition staged at the exhibition.

A selection of Lightfoot models was on display and cabinets and refrigerators by Hussmann, York Shipley, and the Italian firm—Indes, S.P.A.—were on show.

Jackstone
HOSELESS FREEZER



The special patented connections between the freezing plates and the liquid and suction lines incorporate steel trunnions which allow both rotary and telescopic movement during the opening and closing of the freezing plates.

Each moving part has a special sealing arrangement with an adequate safety factor against loss of refrigerant.

The assembly is constructed of finest quality steel with seamless tubing connecting the moving parts. The piston of the telescopic coupling, which is exposed during operation to icing conditions is of stainless steel.

The complete assembly is finished zinc sprayed.

The cabinet is fitted with double doors at front and back for through loading and unloading of freezing trays.

Advantages of Hoseless Connections

1. **Reduce risk of breakdowns and avoid hold-ups in production.**
2. **Reduce expensive losses of refrigerant.**
3. **Reduce costs of maintenance.**
4. **Facilitate faster de-frosting.**
5. **Suitable for all refrigerants—freon, ammonia and brine.**

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35 years of manufacturing low temperature cabinets gives us confidence to offer you . . .

TWO FIVE-YEAR GUARANTEES!

The 'WEMBLEY'
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Over 35 different models of frozen food cabinets . . .

See them on . . .

STAND No. 7 at the SELF SERVICE and SHOP EQUIPMENT Exhibition, OLYMPIA, May 23-27

Eldwood products include . . .

- **FROZEN FOOD CABINETS**
- **BOTTLE COOLERS**
- **DEEP FREEZES**
- **ICE CREAM FREEZERS**
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- **REFRIGERATOR COUNTERS**
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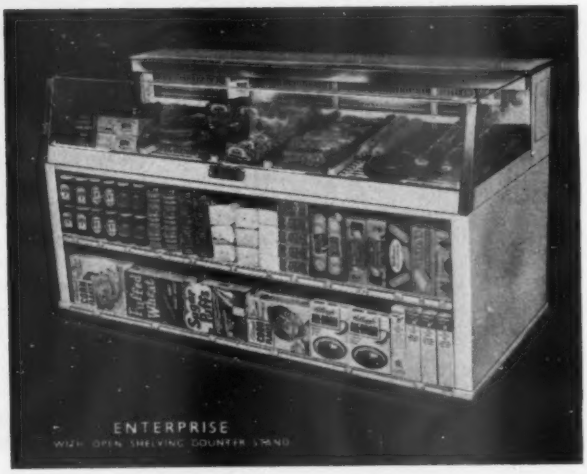

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MOBILE SHOPS AND THE LAW

By LORD MESTON

THE ordinary person in trade and business to-day has generally many obstacles to meet and overcome. He has to pay rates and taxes and numerous outgoings (such as insurance and lighting and heating), in respect of the premises where he carries on business. And he may also have to comply with hygiene regulations in relation to that business itself. It is not surprising that those people who carry on business from fixed premises should look with disfavour upon other people who sell goods to the public from movable vehicles of various descriptions, and who escape the above-mentioned obligations. This raises at once the whole question of " Mobile Shops."

What is a " Mobile Shop " ? There is no definition of such a structure, and indeed there could be no such definition for it is not recognized by the law as being a " shop " in any sense. However, from the everyday point of view, a van or a mobile trailer or even a barrow are all regarded as mobile shops.

Attempts have been made to bring mobile shops within the Shops Acts. The statute dealing with that subject is the Shops Act, 1950, which applies to both England and Scotland. Unfortunately, in a few important respects, the Judicial decisions on the Shops Act, 1950, in Scotland do not conform to the views of the English courts. Therefore, in order to avoid confusion we will consider only the English decisions and also any Scottish decisions which happen to coincide with the view of the English courts.

The history of the matter really began with the Eldorado Ice Cream Company cases (1938). The Ice Cream Company occupied a warehouse for the storage of ice-cream from which on Sunday supplies were given to employees to be sold by each of those employees to members of the public by retail from a movable box-tricycle. That case was decided under Section 11 (1) of the Shops (Sunday Trading Restriction) Act, 1936 (now Section 22 of the Shops Act, 1950), which provided that " no person shall be employed on Sunday about the business of a shop which is open for the serving of customers on that day unless the following requirements are complied with " (*e.g.* as for extra holiday time and other matters).

And then Section 13 of the Shops (Sunday Trading Restriction) Act, 1936 (now Section 23 of the Shops Act, 1950) provided that " the provisions of this Act shall extend to any place where any retail trade or business is carried on as if that place were a shop." The evidence given showed that the warehouse was in the nature of a depot or reservoir to which the ice-cream was taken in bulk, afterwards to be divided into retail quantities and sold at various points in the street. No retail trade was carried on at the warehouse. The sale by retail of the ice-cream was at the movable box-tricycle. It was contended by the prosecution that the warehouse was a " shop." That contention failed as the court held that the warehouse was not a " shop " as no retail trade or business was carried on there.

The prosecution then contended that each of the movable box-tricycles was a " place " where retail trade or business was carried on. That contention also failed, the court holding that the box-tricycle was not a " place." The court indicated that throughout the statute and the regulations made thereunder the word shop connoted some defined and fixed locality and position ; and referred to the regulation which required that the address of the shop or place should be stated. "What would be the address of the box-tricycle ?" the court humorously asked.

We now come to the Shops Act, 1950. Let us look at certain definitions in that Act, before dealing with any more cases.

By Section 74 (1) a " shop " includes any premises where any retail trade or business is carried on. " Retail Trade or Business " includes the business of a barber or hairdresser, the sale of refreshments or intoxicating liquors, the business of lending books or periodicals when carried on for the purpose of gain, and retail sales by auction, but does not include the sale of programme and catalogues and other similar sales at theatres and places of amusement.

Reference should also be made to Section 12 of the 1950 Act which provides in terms that it is not lawful to carry on any retail trade in a "place not being a shop " outside lawful trading hours. And Sections 22, 23, 47 and 58 of the 1950 Act provide in effect that there must be no Sunday trading in a shop or from " any place where any retail trade or business is carried on as if that place were a shop " unless certain requirements are complied with (*e.g.* as to extra holiday periods).

A Recent Case

A determined effort to bring mobile shops within the scope of the Shops Act was made in the Scottish case of Cowlairs Co-operative Society Ltd., –v– Glasgow Corporation (1957). The Co-operative Society had a mobile van in Glasgow, which had nearly all the attributes of a shop. In fact, the shop was built on a trailer, complete with its own counter, shelves and electricity, and was towed every day on to its site on a piece of vacant ground held by the Society on a 99-year lease. The trailer did not trade on the move, but remained on the site during the normal trading hours, and was removed to a garage at night. It was held that the mobile trailer was not a shop within the meaning of the Act. The court pointed out that the fundamental idea of a shop involved trade carried on from premises. You must have premises of some sort—that is the starting point of carrying on your trade. This erection built on a trailer was mobile or potentially mobile, and while it might be here to-day it was uncertain whether it would really be back to-morrow. Accordingly it was held that the mobile trailer was not a shop within the meaning of the Act. The decision in that case coincides exactly with the view of the same matter taken in England.

An attempt was made later to bring a mobile van within the shops Act by a somewhat subtle argument. It was contended that a part of a road where a van was standing was a " place " where a retail trade was carried on. This arose in the case of Stone –v– Boreham (1959) where the defendant was the owner of a motor-van equipped as a mobile shop. On a certain Sunday he stopped his van outside a house and sold a packet of tea to a customer. He was charged with carrying on retail trade at a place—being part of a road situate outside the house—on a Sunday contrary to the Shops Act, 1950. The prosecution

did not say that the van was the " place ", but contended that the ground on which the van stood was the " place " within the Act.

However it was pointed out by the court that this position outside the house was not a " place " where the defendant had set up business or had established himself as people do at the side of a road on Sundays where they put out a table and sell flowers or fruit. It was simply the place where he stopped. Furthermore the van was not a " shop " within the definition of the 1950 Act, and so the prosecution failed on all grounds.

The above decision was logically followed in the case of the costermonger's barrow (Kahn –v– Newberry (1959)). The accused was charged under Section 12 of the Shops Act, 1950, with carrying on retail trade " in a place not being a shop " outside lawful trading hours. The accused had sold apples from his barrow at a pitch in Great Windmill Street, London, at about 10.20 p.m. The accused argued that the barrow was a moving vehicle and not subject to the Shops Act. The court found in favour holding that he was not guilty of an offence under the Act because neither his barrow nor the piece of ground where the barrow was at the time of sales was a " place " within Section 12 of the Act. The court summed up the position, by saying that " it requires more than a casual retail sale to constitute a piece of ground where a retail trade or business is carried out."

To summarise the position, it is well established that a mobile shop is not a " shop " within the meaning of the Shops Act, 1950. The following movable objects, namely vans, box-tricycles and even barrows are not " shops " within the Act. Furthermore, neither the object itself nor the ground on which it stands is a " place not being a shop " under the 1950 Act.

Should anything be done about Mobile shops, and if so, what ought to be done ? Remember, among other things, mobile shops pay no rates, observe no hygiene regulations, are not bound by any restrictions as to hours or Sunday trading. They must not create an obstruction in the highway, but there is nothing harsh in that requirement as it affects all members of the public.

It is submitted here—and this is a purely personal view—that the following alterations should be made to deal with the situation :—

(1) " Mobile shops " should be defined and recognized. The definition should be wide enough to include all movable objects from which any retail trade or business is carried on.

(2) " Mobile shops " should be registered and licensed. That is to say, both the owner and the vehicle itself should be registered, and a licence taken out annually by the owner in respect of the particular vehicle and a fee (so much per annum) be paid in respect thereof.

(3) The particular vehicle which is the " mobile shop " should also be assessed for rating, and rates duly paid thereon as if it were in fact fixed premises.

(4) Hygiene Regulations should certainly apply to " mobile shops " with any necessary modifications.

A SINGLE-STAGE, TURBO WATER COOLING SYSTEM

DEVELOPMENTS in compressor techniques over the years have led to the adoption of the rotary principle. Rotary compressors, whether in the sliding vane or turbo group, present certain advantages over the reciprocating type, among these being simplicity of design, fewer moving parts, lightness, and freedom from vibration. As a rotary compressor has no valves, it can be run at high speeds, to give the same output as an appreciably larger reciprocating piston type of plant.

The introduction of the centrifugal compressor to the field of refrigeration has brought these improvements to all installations where it is practicable to employ this system. The turbo is being found particularly suitable for architectural and marine needs where a cooling system simple to operate and requiring little space is a vital consideration.

With these requirements especially in mind, York Shipley Limited are producing the turbo-compressor for use in a package water chilling system. Through the years many improvements have been made leading to the development of a single-stage centrifugal system that is finding wide application in many parts of the world.

The York single-stage turbo, water cooling system being marketed in capacities ranging from 115 to 600 tons. A compact, self-contained turbo package includes a single-stage, turbo compressor, any type of prime mover, refrigerant condenser, water cooler, purge unit, gauge and safety control panel and Refrigerant-12 refrigerant. This unit is factory assembled and is delivered on two bases ready for installation.

The principal advantages of the turbo are that it can be operated by unskilled personnel or it may be arranged for automatic control ; the reduction in the number of parts has resulted in a more compact system, the use of aluminium rotor and bearings helps reduce overall weight ; while the single-stage design eliminates the need for a flash cooler and extra float valves, piping and insulation.

Any form of prime mover can be used to operate the turbo compressor. Variable speed motors are not necessary because the compressor is readily adjusted to any load conditions by pre-rotation-vane capacity control. The pre-rotation-vanes (PRV) capacity control is an essential part of the turbo. It is located in the compressor inlet, and permits a wide range of capacity reduction from 100 per cent. down to about 5 per cent. It consists of a number of

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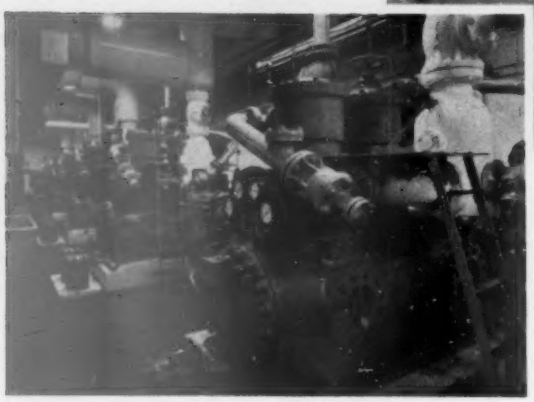

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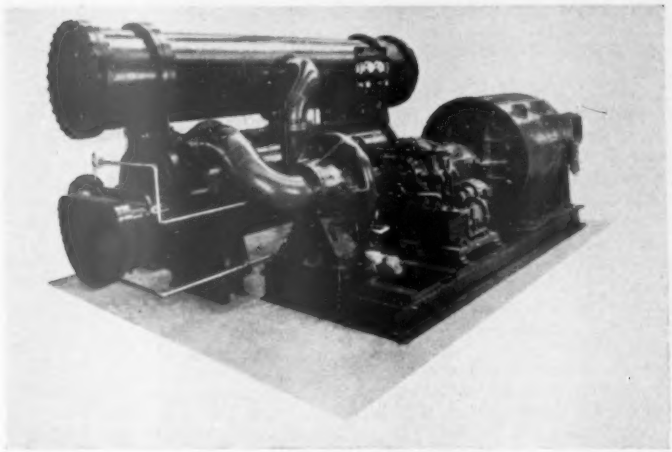
vanes which automatically open and close according to load conditions, regulating the volume, pressure and velocity of gas entering the compressor. Provision is also made for manual operation for starting and for special needs.

An integral force-feed lubrication system, incorporating a self-priming centrifugal pump, keeps the compressor bearings and seal flooded with oil. A sealed lubrication reservoir prevents refrigerant gas from leaking into the oil system, while a micronic type filter removes particles larger than 10 microns.

The evaporator is similarly constructed. Refrigerant enters at the bottom of the shell to chill liquid circulating through finned tubes. A mist eliminator above the tubes prevents liquid refrigerant from reaching the compressor.

If air, water vapour and non-condensable gases collect in the condenser, a self-contained purge unit releases them to atmosphere. If some refrigerant vapour is also withdrawn during this operation, it is condensed, separated and returned to the cooler. The main components of this purge unit are a $\frac{1}{2}$ h.p.



The York Turbo Cooling Set.

The condenser and evaporator are of special design. The horizontal steel shell of the condenser has fusion welded seams. Cooling water is carried through finned tubes of non-ferrous metal and can be arranged for 1, 2, 3 or 4 passes. A perforated steel baffle uniformly distributes refrigerant vapour and prevents it from directly contacting the tubes.

reciprocating compressor driven by a $\frac{1}{2}$ h.p. single-phase motor ; a drier, purge drum, oil separator and concentrator.

The York turbo is equipped with panel mounted gauges and safety controls. These include high pressure and low pressure gauges, and low pressure and a high pressure refrigerant control.

S.I.M.A. TO SHOW AT MOSCOW

THIRTY-FOUR British scientific instrument manufacturers will show and demonstrate their latest equipment at the Polytechnic Museum, Moscow, from June 18–29 this year. The contract for the exhibition, believed to be the first British collective private enterprise exhibition to be held in Moscow, was signed in Moscow on February 17. The Russians have shown themselves to be very interested in the advanced types of instrumentation which exhibitors will be showing and have agreed to consider purchasing those which they require at the exhibition.

The exhibition will be attended by a large number of representatives from all the academic, medical, industrial, and scientific establishments including laboratory and research institutions, throughout the Soviet Union, who will receive special invitations to attend.

The exhibitors will include : the Cambridge Instrument Company Limited, Edwards High Vacuum Limited, Elliott Bros (London) Limited, Negretti and Zambra Limited, and the Solartron Electronic Group Limited.

DURABLE PLASTICS CHANGES NAME

With effect from April 1, the name of Durable Plastics Ltd., Woodbridge Industrial Estate, By-Pass, Guildford, Surrey, was changed to Plastic Coatings Ltd. In all other respects, the company remains the same.

R. S. A. News

The February Meeting

THE seating capacity at the February meeting was fully taken up due to the interest in the subject "Automatic controls." This was the fourth time that this type of subject had been presented and the attendance was proof of its popularity. In place of Mr. Moller-Olsen, as advertised, Mr. J. Ross Jensen, who was on a visit from Denmark to lecture to servicemen on Danfoss products, presented the lecture.

Commencing with a general description of the expansion valve, the speaker pointed out some improvements on earlier models, such as metal bellows covers in place of the plastics covers formerly in use, of steel needles now changed to semi-precious stone to prevent the effect of wear due to corrosion; CH_3Cl. appears to be a culprit in this case. Mr. Jensen also referred to the recently designed valve body that includes a shell housing for the bellows. This allows the bellows to be soldered in the housing to prevent loss of refrigerant should the bellows split or other damage be sustained. The use of push pins and springs for the smooth operation and regular operation of the valve, the advantage of the absorbent phial charge, why a T.E.V. can be mounted in any position without fear of charge reversal, the double contact phial for faster reaction of the valve and the correct positioning of the phial were points clearly explained with the use of charts.

The importance of correct phial positioning was stressed. For example, if the phial is clamped at the bottom of the suction line, "hunting" of the valve can occur. "Hunting" can also occur if the phial is fastened after and not before a heat exchanger. Examples by slides were given of incorrect positioning of phials on suction headers and vertical pipe lines with explanations of the effect this has on the evaporators, together with the steps to be taken to rectify the faults. Of course, at all times the phial is to be securely clamped to the pipe to assure intimate contact that gives rapid reaction of the valve to the conditions existing in the pipe at that point.

The necessity for a valve with an external equalizer line for use with distributors, that ensure equal flow of refrigerant to each evaporator where more than one evaporator is in use, was explained. The correct position of the equalizer pipe connexion on the suction line, *i.e.* after the valve phial, was explained. On the subject of distributors, a venturi type orifice prevents turbulence in the distributor and consequent pressure drop downstream to the evaporators; the distributor should also be watched for dirt particles that can pass through the valve strainer and in time clog up some or all the distributor orifices so cutting down the flow of refrigerant to the evaporators thus causing a lowering of their capacity. It was pointed out that where a valve fitted with an equalizer connexion is installed, the equalizer connexion must be used, otherwise there is a drop in valve capacity. Equalizer lines are fitted after back pressure regulator valves when used.

Line sketches in the form of slides, illustrated actual installations that due to various types of faults were not functioning to their full capacity. Each sketch showed the fault and was accompanied by another sketch showing what steps had been taken to correct such a fault, the speaker explaining in detail why these steps had been taken. It was agreed that this form of explanation was most helpful.

Question time after a lecture dealing with a subject used every day in the field kept the speaker busy and by making use of the sketches, blackboard and his own practical experiences, was able to deal adequately with the problems presented.

* * *

The March Meeting

"Commercial Refrigeration" was the subject that attracted a large gathering at the March meeting. Due to the unforeseen absence of Mr. A. Huntington, York-Shipley, this important talk was presented by Mr. Gerrard of the same company who stepped in at short notice.

Dealing mainly with the important aspect of balance of components, rating graphs and a Mollier diagram for dichlorodifluoromethane were available for members to enable them to follow the speaker during the talk.

Commencing by outlining the steps he intended to cover, the speaker followed this with a blackboard description of the cycle of operations for a typical installation, both air and water being shown as condensing media; to explain how each component—compressor, evaporator, condenser—should balance with each other for efficient operation. A description of refrigerating effect in relation to weight of gas passed—high back pressure giving greater mass—followed. The effect of clearance volume on performance was also explained on the blackboard showing why the clearance space must be small to enable the full weight of suction gas to enter the compressor for efficient operation. Examples of ratios of compression for varying pressures were given. Mention was made that the condenser has as much as 25 per cent. additional heat to reject due to the motor energy during operation. This is a figure that is not always considered.

The respective graphs for a condenser, evaporator and unit cooler that were marked in tons refrigeration, condenser, room and evaporating temperatures were explained showing the capacities of these components at different temperatures. These graphs were blended on the final graph to show how the components balanced each other on a typical installation. The changing conditions of the refrigerant at each stage of the circuit, the heat gain and rejection, were pointed out on the Mollier diagram.

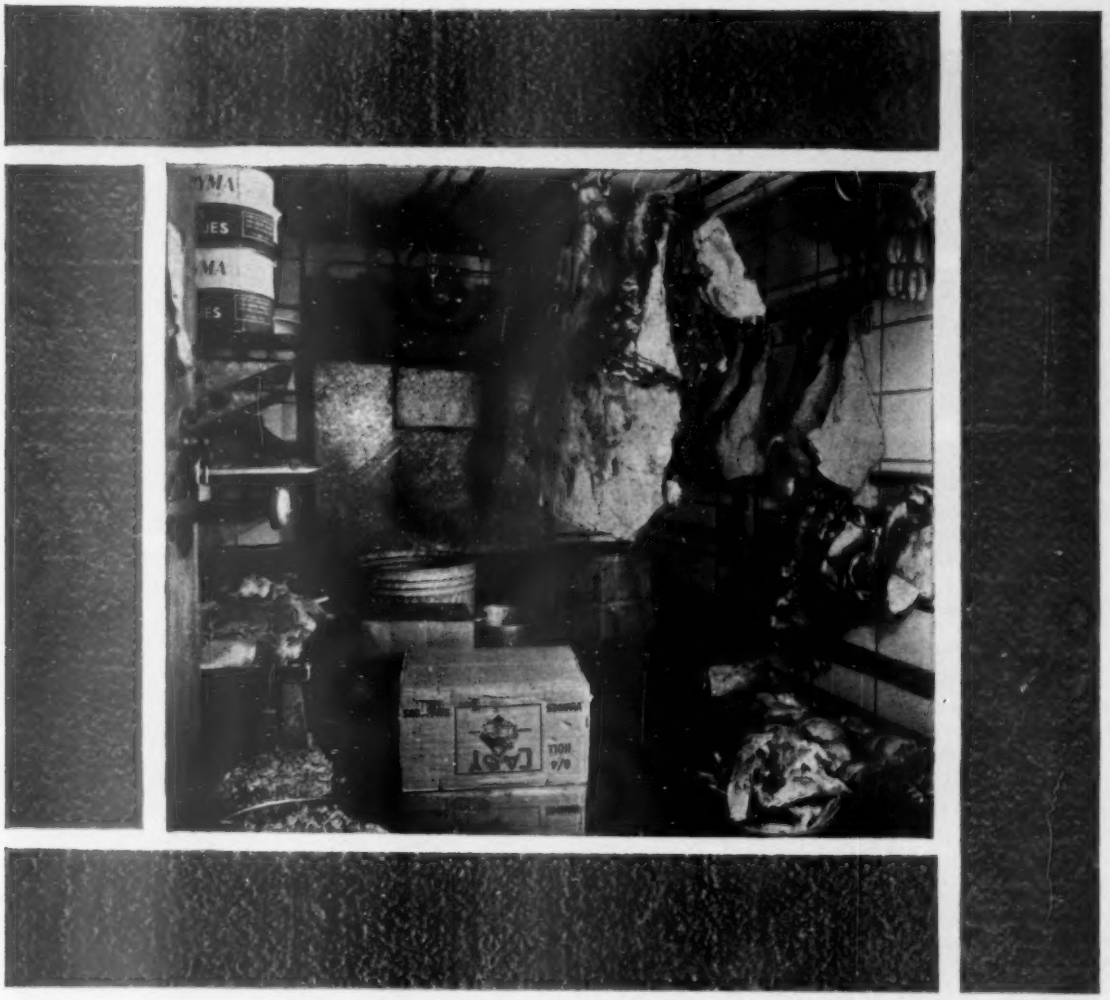
Examples of the effects on an unbalanced system due to poor selection *i.e.* incorrect types of components, were given by the effect on stored produce, compression ratios, high discharge pressures and the over-heating of motors.

Closing his most interesting and important talk, Mr. Gerrard said he hoped he had offset future incorrect balancing by arousing interest in the necessity for correct balancing of plants.

As is usual, question time showed members' interest. It was during this period that an interesting discussion arose regarding the positioning of a T.E.V. phial where a heat exchanger is in the circuit; good reasons being put forward for positioning the phial after the heat exchanger.

After thanking the speaker for his absorbing and enlightening talk given at short notice, the meeting finished with a general discussion among members.

The increasing use of refrigeration by the poultry industry was indicated by "Quick-freezing of poultry," the subject for this session's final meeting which was held April 27.



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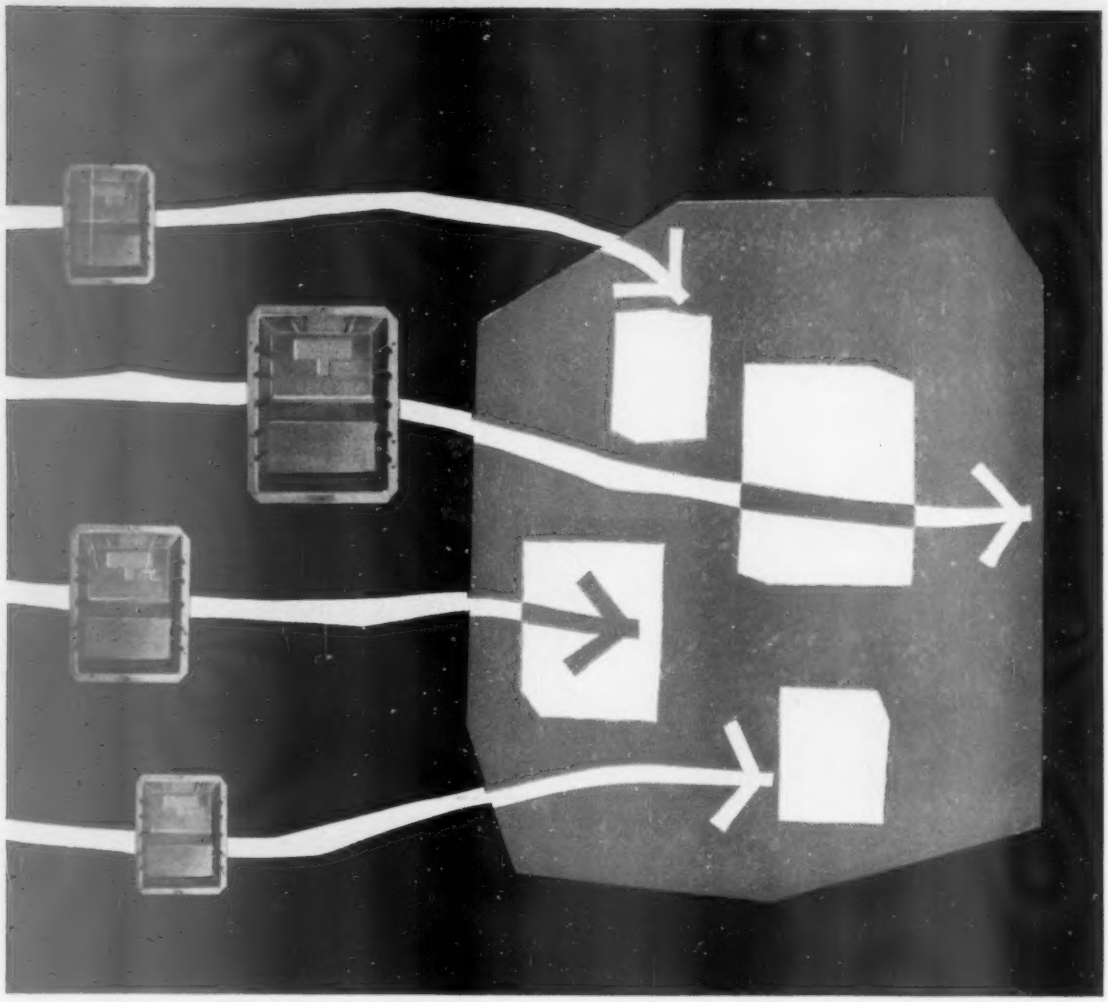

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Loading and Unloading of Plate Freezers

THE physical effort involved in handling 1¼ tons of fish into and out of a 15-station freezer has always been difficult, and whilst it is not the heaviest job in a freezing plant, it is very difficult to achieve a regular cycle time for the freezer with manual operation.

When Williams Engineering introduced their "direct conduction" plate the very high-speed freezing highlighted another problem.

When the freezing time was two hours, a 10-minute handling time was not unreasonable, this being 7½ per cent. of the operating cycle. Related to the new freezing time of 50 minutes this becomes 20 per cent. and, whilst many operators and engineers would have been happy to have the improved quality characteristics imparted by the faster freeze and to have halved the operating cycle, there were some keen types whom, whilst knowing the saying "You cannot have your cake and eat it" were not satisfied and set out to return the handling time percentage to the original 7½ per cent. figure. Such people exist in Eskimo Foods Ltd. and G. Williams Engineering Co. Ltd. and, in due course, after much experimental work, a mechanical aid was devised as an attachment to a fork-lift truck.

At the end of the freezing cycle the truck, correctly aligned by an adept operator (and it is surprising how adept they become within a very short time), approaches the freezer, its engaging hooks fully extended forward. When the hooks are in position under the tray handles a short upward movement engages and lifts the trays thus breaking the ice weld. The operator then retracts the hooks into the travelling position bringing with them 60 trays each containing three stone trays of fish from the freezer. A quick movement of the truck aligns it with a prepared rack onto which the trays are unloaded by a reversal of the loading operation. Adjacent stands another similar rack, fully loaded with trays of fish waiting to be frozen, a few quick movements of the truck and the next load is into the freezer.

The entire operation of unloading and reloading is accomplished in only four minutes.

The operators have ample time between freezes to remove the frozen fish from the trays, leaving the frame to be refilled by trays of fish from the preparation lines ready for the next loading operation.

"The future for this type of equipment appears to be very great," states Mr. Jack Townsend, general manager of Williams Engineering, "and whilst many companies cannot justify the use of fork-lift trucks for normal cold store work, as a dual-purpose unit capable of giving a faster turn round of the freezer and as a general duty truck, the position is changed, and a new approach to freezing plant mechanization can be envisaged."

Negotiations have been concluded with the Thos. W. Ward Ltd. Group of Sheffield, and the **Anchor Insulating Company Limited,** Plumstead, London, S.E.18, whereby the latter company has become a subsidiary of the Ward group, and will operate in close association with the Dick's Asbestos and Insulating Co. Ltd., Eagle Works, North Woolwich Road, London, E.16. F. W. Robinson, S. J. Dyal and W. S. Isherwood, directors of the Dick's Asbestos Company, have joined the board of Anchor. Mr. W. S. Isherwood has been appointed general manager, and Mr. R. A. Fishlock will continue on the board of the company, responsible for the sales direction. W. G. R. McNee and H. L. Perkins have resigned their directorships, but will continue in their respective executive capacities, as before.

* * *

The complete new range of refrigerators manufactured by **Kelvinator Ltd.,** were shown by the company at the Electrical Development Association's conference exhibition to be held at Harrogate on March 8 to 10. The range now includes the 4·6, 6·0, 7·7, 9·4 and 13·0 c.ft. models, in the new spaceline or square-cut look. New also is the 10 c.ft. domestic freezer unit that Kelvinator have introduced to this country to meet the growing demand from housewives for home-freezing facilities. All the refrigerators apart from the smallest one are equipped with an extra low-temperature freezer chest, a feature that permits the prolonged storage of frozen food and the freezing of garden produce.

* * *

NEW BENDIX RANGE

A new range of five domestic refrigerators has been introduced by Bendix Home Appliances Limited, Albian Works, Kingsbury Road, Birmingham, 24. These models, which are available in either white or cream, incorporate the Tecumseh unit, and have a choice of 10 temperature settings. A freezing compartment is provided in each model and the 21-cube ice trays are fitted with a quick-action ejector. A low temperature chill draw is included for uncooked meats and fish, and an interesting feature is a large glass-covered crisper for the storage of fruit and vegetables. The backs of the doors on each model are provided with egg racks, butter and cheese compartments, and a spacious bottle bar. Interior lighting is included.

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NEW STYLE MEAT SHOP

In a new continental-styled meat shop which George Guthrie & Son, Limited have opened at Victoria Road, Glasgow, display counters and a built-in cold room were installed by Craig-Nicol Limited, Glasgow. The main shop counter, is a special Craig-Nicol "Kintyre" refrigerated display counter which has an overall length of 18 ft. 6 in. It is built-up of two 5 ft. refrigerated sections and three non-refrigerated extensions to accommodate scales and slicers. Each refrigerated section is fitted with a stainless steel liner coiled on the back and underside and enclosed with a high glass display case. Fluorescent lighting is incorporated along the back to illuminate the display.

The base of each refrigerated section is used to house the condensing unit and all ventilation is to the back so that the attractive full length front remains unbroken. To provide adequate storage of meat, a cold room of approximately 350 c.ft. capacity has been built into the rear section of the shop. The cold room is finished internally on the walls with white glazed tiles. Normal cold room fittings are provided but in order to give additional display, a window formed with a triple glass hermetically sealed unit, set in a stainless steel sash, has been built into the wall facing the shop. The window is fitted with stainless steel hanging rails and lighting to illuminate the display. Further lighting is fitted in the interior of the cold room and, as an additional safeguard, two 12 in. germicidal lamps are fitted. A further counter of the fan-assisted type is installed for the display of pre-packed frozen lamb. This counter, which is of the open top serve-over type, has a remote machine fitted in an external unit housing. The coil of this counter is of the finned type with an automatic electrical de-frost system contained in a suitable coil housing built into the counter.

The new Craig Nicol-equipped shop in Glasgow.

BELLISS AND MORCOM ROTARY COMPRESSOR

Well-known for their steam and diesel engines, steam turbines and reciprocating compressors, **Belliss & Morcom Ltd.** of Birmingham, are now making under licence the French M.P.R. rotary compressor. This new development now extends their range of compressors into the smaller sizes with what they consider to be the most suitable design for small volume requirements. The B. & M. Rotary compressor is the product of Belliss & Morcom "know-how" built up over 56 years of compressor building, coupled with the experience accumulated by M.P.R. in establishing during 40 years an organisation now producing about 1,000 machines a year in France, besides similar numbers under licence in other parts of the world. The design and construction of the B. & M. rotary compressor is inherently simple, yet robust, with the minimum of moving parts. Horizontal, free-sliding blades, machined from a special resin bonded material, are mounted in longitudinal slots in a rotor, and are flung outwards under the influence of centrifugal force, maintaining constant contact with the cylinder walls. The rotor, which is integral with the shaft to avoid shrink fits and unnecessary stresses, is made from high grade solid bar or forgings depending on size and is eccentric in the cylinder but on the vertical centre-line.

* * *

MONSANTO AGREEMENT WITH FLAMINGO FOAM

An agreement with A/S Flamingo Foam, of Copenhagen, Denmark, for the purchase of its British subsidiary, **Flamingo Foam Ltd.**, of 34, Victoria Street, London, S.W.1, is announced by Monsanto Chemicals Ltd. The Danish company manufactures foamed polystyrene board, a widely used thermal insulation material, which is imported and marketed in Britain by Flamingo Foam Ltd. Under the terms of the agreement, Flamingo Foam Ltd. will now manufacture and market its own insulating board in Britain. Mr. Gilbert Dodd, who has wide experience in the plastics and allied industries, has assumed full responsibility for the development and management of this new operation in addition to his present activities with Monsanto and as a director of R. H. Cole & Co. Ltd. In order to facilitate distribution, the insulating board will be made at various key centres in the United Kingdom. The first Flamingo Foam factory will be in the London area, and it is hoped that it will be in production during the second half of 1960.

APPLIANCE MARKETING IN THE UNITED STATES

The Distributor Franchise

By WAYNE P. HANSEN

FRANCHISES in the U.S. appliance industry are normally exercised at the distributor level only, since the majority of dealers prefer not to sell one brand exclusively unless it is a top, full-line seller. Because the distributor has to be made responsible for servicing a line as well as selling it, it is limited through cost considerations to one brand of any appliance type. A distributor may carry different brands, if each appliance is complementary, not competitive.

Geographic Limitations in the Appliance Franchise

In most states the manufacturer limits the distributor to a certain fixed area, except in Texas where designated geographic or political boundaries are prohibited from appearing on a franchise due to this state's anti-trust laws. A distributor will in most cases service parts of or entire states other than the one it is headquartered in. In large metropolitan markets a franchise might restrict such activity to a city, township, or country. The geographic areas covered are usually based on a number of important market considerations which are covered later.

Restrictions and Extent of Product Coverage

The franchise will state what appliances are to be sold with the manufacturer's trademark to the specific exclusion of competitive products. Some instances occur where a distributor had previously carried a number of independent lines and was taking on a series of appliances of one factory. If one of these brands had been a heavy seller as compared to the territory sales of his new supplier for a particular product, the latter may allow the distributor to keep this independent label in order to secure a high potential channel for the rest of the line. In such an instance other means of distribution will have to be found for the appliance not carried by the distributor.

Factory Sales to House Accounts

Provision is made in the franchise for house sales to other manufacturers for distribution under their own label and to national mail order houses, buying co-operatives, chains, etc. for private labeling. The factory may also let hospitals, schools, governmental bodies, public institutions, and its own employees purchase its appliances in the state in which the distributor does business. Other direct sales may include those to apartment houses through agents; builders, and to public housing authorities, and some dealer outlets. These house sales are billed at distributor cost plus five per cent. which is rebated to the distributor.

Factory and Distributor Shipment Liabilities

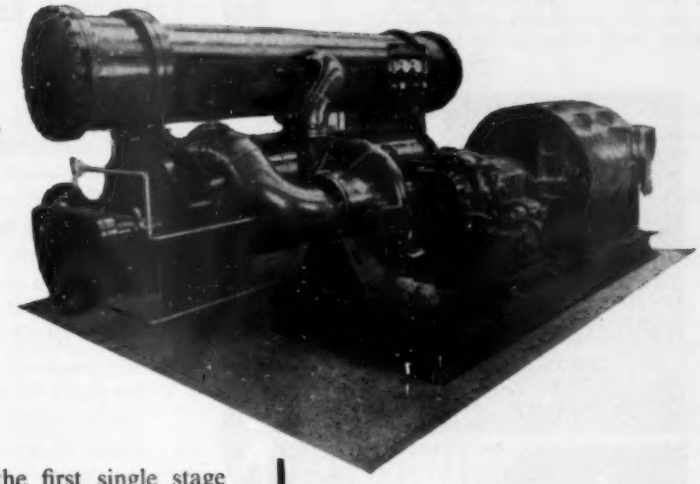
A franchise will declare that all orders will be filled as promptly as possible, but that delays or non-shipment will not be cause for damages. The title to and ultimate right of possession of appliance shipments resides with the manufacturer until such time as payment is made in full. The distributor has exclusive rights in his designated area only, but such infringements as may occur through the action of other distributors or dealers will not make the manufacturer a party to such infractions of the franchise.

Distributor Sales and Servicing Facilities

Manufacturers are especially concerned with the type of sales and service organization that the distributor maintains, for in it rests the volume and goodwill that the factory expects from a territory. Sales personnel must be of a sufficient number, trained in their work, and of a quality suitable to the supplier. These standards are also stated as pertaining to the installation and service departments, and to field work during and after the warranty period, on any appliance supplied by the manufacturer. A proper supply of parts necessary to maintain such products must be kept in

TURBO SET FOR AHMADI HOSPITAL KUWAIT—

and another first for YORK



What are believed to be the first single stage turbo compressor water chilling systems to be exported from Great Britain to the Middle East left recently for Kuwait Oil Company's new hospital.

Two entirely self-contained turbo packaged water cooling systems were designed, with special consideration given to the problems arising from insufficient fresh water supplies and the necessity of using sea water for cooling. Each system is rated to cool 875 gallons per minute, which represents a heat removal rate of 4.2 million B.Th.U's per hour.

Consulting Architects and Engineers:—
HUCKLE & DURKIN,
London

Main contractors:—
BRIGHTSIDE HEATING & ENGINEERING CO. LTD.,
London

YORK SHIPLEY LIMITED

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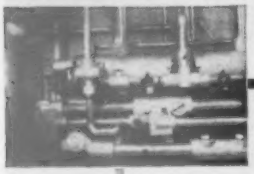

Our great achievements in designing and building many of the largest and most up-to-date cold stores in the country have taken us right to the forefront of the industry. But the design and construction of large cold stores is not our only activity. We are also specialists in all the "built-in" applications of insulation, factory insulation, and pipe insulation and boiler covering; have been for years! No job has ever proved too big or too difficult for Smiths, so if you have a project in mind of any sort involving insulation or cold storage, why not consult our design engineers first? There will be no cost or obligation, and remember, we can handle the job completely, right from the original drawings.

Cold Store design and construction

"Built-in" applications of insulation

Factory Insulation

Pipe Insulation and Boiler Covering

Smiths Insulations Ltd.

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London Office: 105 Empire House, St. Martins-le-Grand, E.C.1. Tel: MONarch 2000

stock, as well as warranty information on the units in the field.

The Distributor Inventory

In acting as a distributor for a manufacturer, the former is expected to keep an adequate inventory of all models of the appliances so specified in the franchise. This is to eliminate any out-of-stock condition at the dealer level which can prove costly in terms of lost sales and goodwill. The distributor is expected to maintain a showroom with a display of all such products on a current model basis.

Distributor Limitations on the use of Trademarks

The manufacturer's trademark is established in the consumer's mind by means of costly advertising and promotional activities. This represents goodwill and is retained by the factory for use by the distributor in a manner subscribed to sell the product-line. As such, the trademark may be displayed by the distributor, but he must not use it in the name under which he does business. This policy does vary and is being dropped by a few of the automobile manufacturers who had adhered to it quite closely in the past. The distributor may be cautioned against letting any service agency, dealer, or other similar type of business establishment use the factory trademark in their name. When the franchise is concluded the distributor must drop the use of this trademark in all forms, any goodwill that may have accrued by reason of field promotional activities at the distributor's expense will be purchased for a nominal legal closing fee.

Damages to Appliance Shipments

The manufacturer when shipping on an f.o.b. factory basis may incorporate into the franchise a clause regarding its non-responsibility for appliances transferred to a common carrier. This is also found in the bill of lading accompanying any shipment. The distributor or dealer must collect from the transportation company if any appliance shipment suffers damage or loss. Such an occurrence when concealed within a sealed packing case throws the responsibility of claim payment back to the factory. A practice employed by some trucking firms of "humping" on a tailgate can lead to serious damage to some types of appliances. To locate the point of responsibility for damage or loss may mean the difference of many dollars in the sale of appliances. Ten days is usually allowed for the filing of a claim by a distributor or dealer against a common carrier.

Distributor Promotions in Line with Factory Policies

A manufacturer feels that the distributor should assume the responsibility of displaying the factory trademark on the latter's showroom exterior, warehouse, and/or office. In addition to having the current appliance line on the showroom floor, the advertising material supplied by the factory should be in view or readily available. The franchise will usually limit the distributor to a promotional campaign consistent with established factory policies pertaining to this subject.

The Exercise of Factory Rights

The manufacturer reserves the right to change prices, terms, discounts, models, and features of its appliance line. No recourse for any monetary loss suffered by a distributor is offered in the sales agreement. This also includes parts necessary for the appliances purchased from the factory. Warranty covering such products are different according to the appliance characteristics and hence are served by separate agreements binding at the time of sale and verified by service records.

The Termination of Franchises

Termination of franchises must be undertaken in most cases within 30 days prior to the actual severance of business ties. Notice must be in writing and as customary with legal validity must be postmarked or personally delivered to the other party's place of business before commencement of the 30 day period. Cause may or may not be stated, but full sales and service have to be maintained during the termination phase. The franchise may be similar to regular articles of partnership wherein the death of one party to a distributorship automatically cancels it. This is also true for proceedings in bankruptcy, receivership, or dissolution. No assignment or transfer may be undertaken by the distributor without the express permission of the factory.

The Liquidation of Distributor Inventory

The factory usually reserves the right to repurchase or decline the stock of appliances and parts still held by a distributor once a franchise has been terminated. This may depend on which party took action to sever the relationship. The distributor is required to account to dealers for any goods or credits of theirs which are still held by the former. There is in most cases a stipulation of a percentage of sales payment by the distributor to the manufacturer for appliances sold and still in warranty. The factory will assume the responsibility for such warranties, or transfer them to a new distributor for the continued maintenance of its products in the field.

Agreements Other Than Those Stated in the Distributor Franchise

As in most contracts of this type, the manufacturer denies the right of any verbal or other type of agreement made by other parties than those so listed on the franchise to become binding, either prior or subsequent to its signing.

No contract issued by the distributor on its own form or letterhead may take precedence over the franchise originally signed by him.

The franchise is thus seen to be a legal document giving rights, duties, and restrictions to both distributor and factory. It is superseded upon a change in territory, parties to it, or product coverage with the issuance of a new agreement.

Milk Vending in Scotland

The Scottish Milk Marketing Board is making an effort to encourage increased use of milk vending machines. The Board is satisfied that more milk can be sold if it is available when required. There are already 140 machines operating in Scotland but there are still many sites which could be used. A stock of machines for trial runs on suitable sites is being made available by the Board, which considers that a considerable proportion of the increased milk sales of the past 18 months has been derived from vending.

* * *

Polypenco Limited, 68/70 Tewin Road, Welwyn Garden City, Herts, has appointed two new agents. The companies and their areas are as follows : Invicta Plastics Limited, Oadby, Leicester (Derbyshire, Leicestershire, Nottinghamshire, Northamptonshire) ; Kenneth Forbes Limited, Brandon Creek, Downham Market, Norfolk (Norfolk, Suffolk, Cambridgeshire, Huntingdonshire, Rutland, Lincolnshire, Soke of Peterborough).

DOMESTIC REFRIGERATION DEVELOPMENTS

ELECTRICAL VIEWPOINT

A survey which is being conducted by the Electrical Association for Women during the next few months in order to obtain opinions on the design and performance of domestic electrical equipment from users throughout the country, is entitled " Electrical Viewpoint." The survey also provides an opportunity for suggestions to be made for improvements or developments which will help manufacturers to meet the needs of the domestic market in the future. The survey takes the form of a questionnaire which is being studied by the 200 branches of the Association throughout the country. The branches have been preparing themselves for some months by holding meetings at which members have discussed their own appliances and familiarized themselves with types of equipment different from their own. It is hoped that interested members of other women's organizations and of the public generally will also wish to take part in the survey by completing the questionnaire. The questionnaire is in two parts. Part I seeks specific information from users about the equipment they possess. Part II provides scope for personal expressions of opinion ; it invites participants to make suggestions and comments and to indicate the reasons why they do not possess certain appliances.

GAS SALES AT " IDEAL HOME "

More than 1,200 refrigerators were sold from the Gas Council's stands at the Ideal Home Exhibition this year ; this compares with 519 refrigerator sales last year. This year, too, nearly 250 firm enquiries relating to " fridges " were dealt with ; last year the figure was 160.

Sales of 2,358 appliances on the stands brought in a total of £82,421 ; nearly 2,600 enquiries were dealt with and it is expected that most of these will lead to sales. The present " boom " in gas refrigerators was reflected in the large sales, but sales of cookers and laundry equipment were also very encouraging. Particular interest was shown in central and warm-air heating ; 1,400 enquiries being received for central-heating boilers and more than 130 for warm-air heating systems.

Over-all sales of gas domestic refrigerators in the nine months ended December, 1959, totalled 66,900 compared with 37,700 in the nine months to December, 1959, an increase of 77·5 per cent.

HOTPOINT REDUCE PRICES

Following the budget, when reductions in the rates of purchase tax for the coming fiscal year were made known, A.E.I.-Hotpoint Ltd. have announced reductions varying from five to ten per cent in the list prices of their refrigerators and washing machines.

NEW ELECTROLUX MODEL
The L.27

Electrolux Ltd. has launched a new refrigerator, the 2·7 c.ft. L.27 family model which is available for operation by bottled gas or paraffin. It is designed to fit into a confined space yet provide sufficient storage capacity for an average size family. Distinctively styled and sturdily built to give many years of reliable service, the Electrolux L.27 has 5½ sq. ft. of shelf area including a gated shelf for storing really tall bottles. Door storage space includes an egg rack, a shelf for bottles and two covered compartments for cheese and butter—complete with butter dish. Frozen food can be kept in the ice compartment when it is not being used for ice making, and the two ice trays supplied make a total of 18 cubes at each filling ; both trays have flexible cube dividers to allow the removal of single ice cubes.

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This isn't the answer in every case of course, but in many other fields the same vigorous Williams approach has resulted in the design and installation of novel plants.

Here are some examples:

The vigorous approach

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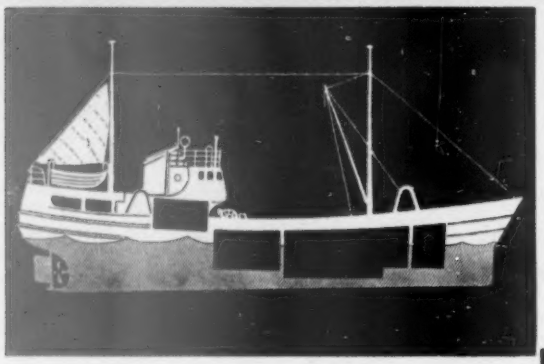

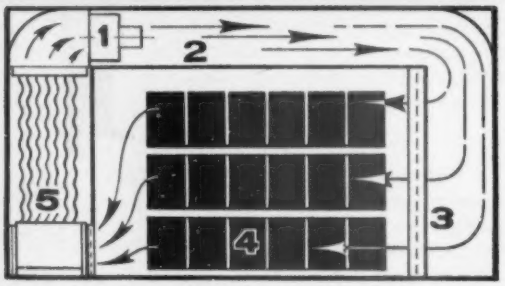

1. Axial flow fans 2. Duct formed in space above false ceiling 3. Air distribution louvres 4. Product to be frozen 5. Cooling coils

Quick freezing at sea

Blast freezing plant, with storage for 70 tons at −10°F, installed in the sea-going trawler 'Autumn Sun' of the Henry Sutton Organization—a new approach to fish freezing.

Controlled freezing of liquid egg

For the Southern Oil Co. Ltd.—Blast Freezing Chambers for Liquid Egg—with a daily capacity of 20 tons, also storage facilities for 100 tons.

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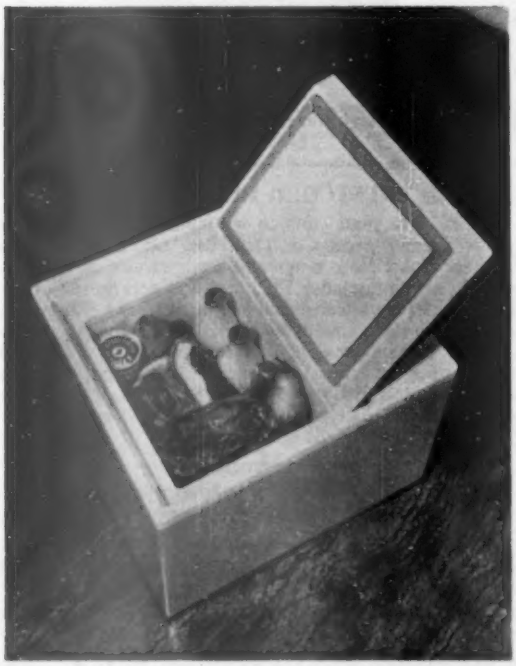
THERMO-ELECTRIC REFRIGERATION

AS a result of work carried out at The Research Laboratories of The General Electric Co. Ltd., at Wembley, Middlesex, what is claimed to be the world's first prototype thermo-electric cold box has been made. The system offers the advantages of lightness, no moving or wearing parts, silent operation and the avoidance of the use of chemical refrigerants ; furthermore, it can operate directly from a battery d.c. supply, useful for cars, trains etc. Likely developments in thermo-electric refrigeration include air-conditioned protective clothing in which thermo-electric elements would chill or heat the air in circulation within the suit as the ambient conditions require —(useful for space travel ?) In medicine, thermo-electric cooling may be applicable for cold storing specimens in portable carrying equipment in which they are conveyed, for example, from the operating theatre to the pathology laboratory. The power-handling capacity of transistors can be multiplied several times if local cooling by thermo-electric means can be applied and already the principle is used to cool the lead sulphide detector cells in the infra-red sensing devices of air-to-air missiles.

The G.E.C. cold box works on the principle of the Peltier effect : the production of cold at one side of a thermocouple and heat at the other when direct current passes. The idea has been developed to a practical stage by G.E.C. by evolving efficient semi-conductor thermo-couples and forms of construction that provide adequate thermal isolation between the hot and the cold sides of the junction. Each thermocouple operates at low voltage and 5–10 amp., cooling power being about ¼ W. The drop of air temperature obtainable in an enclosure is 20 ° to 30° C. The prototype illustrated is about one cubic foot in size, with drop down door and can be carried in the boot of a car.



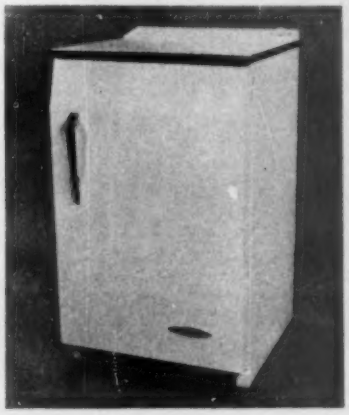
World's first commercial design thermo-electric cold box has no moving or wearing parts; can operate off a car battery says G.E.C.

On April 17, A.E.I.-Hotpoint Ltd. featured a 20 minute advertisement on ABC TV to promote their range of products. The feature was transmitted in the " What's in Store " series over the entire ABC Network (the North and the Midlands) at 5.45 to 6.05 p.m.

PAKAMAC ENTER DOMESTIC REFRIGERATION FIELD

Pakamac Ltd., Oldham, who just 11 years ago sparked off a minor revolution in rainwear, have now

entered the domestic refrigerator market with the launching of their new Pakamatic " Economy—Plus," model PK 350. Costing 52 guineas, it



has a 4-c.ft. cabinet containing 7¾ sq. ft. of shelf space. It is 36¾ in. high, 22 in. wide and 25½ in. deep, and its outer shell is made of zinc-coated sheet steel for rust resistance. The cabinet and door liners are made of ice-blue polystyrene.

Storage space includes a shelf for large bottles and racks for dairy goods in the door, a vegetable shelf, a large freezer on the ice tray, and a chill tray for meat and left-over dishes, while the top is surfaced with Melamine to give a durable working area. The PK 350 is accompanied by a five-year guarantee and it is covered by an efficient " after-sales service " with depots in all parts of the United Kingdom.

The absorption unit is at present being made for the company by Kreft, of Germany, but it will eventually be made in this country. Insulation is with Rocksil.

The company states that its first year's production will approximate 20,000, to be doubled in the second year.

DENHAM & MORLEY

Denham & Morley Ltd., who recently began distributing a new three-model range of Denmore refrigerators, have announced a reduction in the price of the 4½-c.ft. Denmore 45, the largest of the trio. Mr. K. Lowy, sales director of the company, announcing the reduction from 65½ guineas to 59½ guineas, said, " the surprisingly big demand for this model and the placing of substantial forward orders have made it possible to adjust the price of the machine so quickly."

Basic price of the Denmore 45 is now £52 16s. 4d., plus £9 13s. 2d. purchase tax.

NEW COLDETTE CADET

Coldette Refrigeration of 11 Dafforne Road, London, S.W.17 has announced its new domestic refrigerator, the Cadet. This model, which is of 3 c.ft. capacity and has a shelf area of 5.5 sq. ft., incorporates the Atlas absorption unit. Three external finishes are provided—oak, walnut, or mahogany. The height is 35 in., depth 23 in. and width 21 in. Retail price is £57 13s. 0d. including purchase tax.

SCOTTISH COUNCIL APPOINTMENT

Mr. Willis Roxburgh, managing director of **Morphy-Richards (Astral) Ltd.,** has been appointed a member of the newly-formed Scottish Council's Committee of Inquiry into the Scottish Economy. The main function of this committee is to produce a reliable guide to the future industrial development of Scotland to enable positive steps to be taken in the reduction of unemployment. Mr. Roxburgh is one of the five full members appointed and will aid the committee as a Scottish manufacturer of durable consumer goods.

Mr. Willis Roxburgh, managing director of Morphy-Richards (Astral) Ltd.

PRESTCOLD RETIREMENT

After many years' service with the Prestcold Division of the Pressed Steel Co. Ltd., Mr. L. H. Kennett has retired. Apart from a period of war service he had been with the company since 1939 and was a very well-known figure in the electrical, retail and distributive trades. He started with the company as domestic sales manager of the London branch and at his retirement was contracts manager for the United Kingdom. At a recent ceremony at the London Office, the United Kingdom marketing manager, Mr. M. Horris, presented Mr. Kennett with a gold watch to mark the occasion.

Part of their book, " Process Integration and Instrumentation," will be " brought to life " on the Electrical Development Association's stand (F250) at the **Instruments, Electronics and Automation Exhibition** (Olympia, May 23 to 28). There is a great variety of electrical and electronic techniques available to the manager and production engineer, and the EDA exhibit will help in the choice of equipment. " Process Integration and Instrumentation " is number eight in the Association's well-established " Electricity and Productivity " series.

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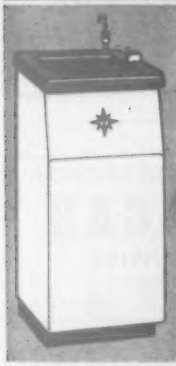

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MEAT

Thomas Borthwick & Sons Ltd., Audrey House, Ely Place, and Central Markets, London, and the Provinces. Telegrams: "Overdraw, London." Tel.: Holborn 5234 (7 lines).

COMMERCIAL AND INDUSTRIAL SECTION

Manufacturers' and Distributors' News

The accompanying portrait is of Mr. R. A. Edmonds, the director in charge of manufacturing and electrical divisions of **Mann, Egerton Ltd.** of Norwich. The manufacturing divisions of Mann, Egerton include refrigerated vehicles, transport service equipment and school furniture, in which industry they are

the third largest in the country. The electrical division is concerned with commercial contracting, refrigeration (domestic, commercial and industrial) and marine electrical contracting. Mr. Edmonds joined Mann, Egerton as works manager at Norwich in 1952 and joined the board in 1955. He is a member of the Institute of the Motor Industry and a fellow of the Incorporated Sales Managers' Association.

* * *

At his own request, **Sir William Garrett** has relinquished his executive responsibilities with Monsanto Chemicals Ltd., in order to devote more time to his other interests. He is continuing as a member of the board. Since 1957 Sir William had, among his other executive activities, held the position of personnel director of Monsanto Chemicals Ltd. These duties will now be assumed by Mr. N. F. Patterson, director in charge of engineering and purchasing. Sir William is chairman of the Association of British Chemical Manufacturers and a director of Metal Industries Ltd. He is a member of the Civil Service Arbitration Tribunal. He was president of the British Employers' Confederation from March 1958 until March 1960.

* * *

Mr. S. E. Chaloner has been appointed controller of personnel of Monsanto Chemicals Ltd. and will be responsible for the personnel function in the company including staff relations, recruitment and training, general personnel and industrial relations policies. He will report to Mr. N. F. Patterson. Mr. Chaloner, who for the past 12 years has been chief personnel officer, has been with Monsanto for 35 years and has had previous experience of research, production and personnel management at factory level. A graduate of Manchester University, he is a member of the executive board of the Association of Chemical and Allied Employers, a Governor of Hendon Technical College and a member of the Institute of Personnel Management.

* * *

Mr. Noel Bushell has been appointed sales manager of Pakamac Special Products Ltd.—the new company formed by Pakamac Ltd. of Oldham, to market refrigerators, under the brand name of Pakamatic. Formerly sales promotion manager of Ada (Halifax) Ltd., Mr. Bushell has spent 17 years in wholesale distribution of electrical appliances in England and Wales.

* * *

Mr. Nigel Jeffery Froy, a director of W. N. Froy & Sons Ltd. has been appointed joint managing director.

* * *

Firth Cleveland Pumps Ltd., a member of the Firth Cleveland Group, have moved to a 40,000 sq. ft. factory at Earl Shilton (Telephone Earl Shilton 2071), about two miles from Markfield, Leicester, where the company has been established for many years. All the company's employees at Markfield will continue to work at Earl Shilton. In addition, employment will be available for a high proportion of the men and women who lost their jobs when the previous owners of the Earl Shilton factory ceased production. The move to Earl Shilton will enable the company to establish considerably enlarged machine shops, and carefully sited assembly lines for the wide range of Barnes Self-priming and Dickow Self-priming pumps, and Firth Cleveland Water Systems now in production at Markfield.

* * *

British Geon Limited announces that work will shortly begin on a £2,000,000 extension to its polyvinyl chloride plant at Barry, South Wales. British Geon is jointly owned by The Distillers Company Limited (55 per cent.) and the B. F. Goodrich Chemical Company of America (45 per cent.). This will be the eighth extension of the Geon PVC plant during the 13 years it has been in operation. Constructional work is expected to be completed during the second half of next year.

* * *

The Yale & Towne Manufacturing Company, a major producer of materials handling equipment and locks and hardware, achieved its highest-ever sales in 1959, states Mr. Gilbert Chapman, president, in the company's 91st annual report.

". . . The largest percentage increase in sales occurred in the company's materials handling equipment operations . . . reflecting the strong recovery of the capital goods market from the 1957-1958 recession. Throughout the world, the markets for the company's products continued to expand, pointing to enlarging opportunities for increased sales in the years ahead." Yale & Towne's 1959 sales totalled £51,474,242 an increase of 24 per cent. upon 1958.

* * *

Following the success of **Breeza** fans and blowers the **London Fan & Motor Co. Ltd.** of 27 Brecknock Road, London ,N.7, have introduced a new range of small fans costing less in price, and known as the **Summit** range. These economical units are fitted with sturdily constructed, totally enclosed, shaded pole motors having sleeve bearings which are lubricated by large saturated pads. It is, therefore possible to give the fans years of continuous use under normal conditions without the need for external lubrication. **Summit** fans are available as motor and blades only or complete with three fixing arms, whilst square mounting plates are available at a small extra charge. All Summit fans are suitable for mounting in any position and can be used with automatic louvred shutters when necessary ; they are non-reversible, have a standard working temperature range of 10° to 120° F. and are supplied plan "A" (that is air over motor and through blades) unless otherwise specified by the customer. These economical fans are extremely light in weight, very compact and easily fixed. An illustrated leaflet is now available on the range and is obtainable from the manufacturers.

* * *

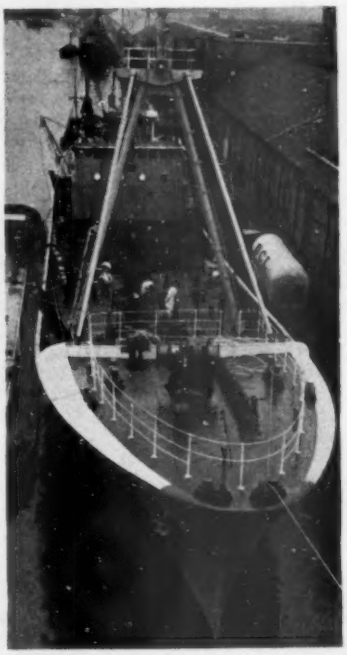
A new range of centrifugal pumps with the name " Sultan," has been announced by **Pegson Limited,** Coalville, Leicestershire. The Pegson-Sultan pump is a vertically split, end suction, single stage, centrifugal pump. It is being produced in sizes from 1½ in. to 12 in. suction branch diameter, the entire range comprising 42 pumps with capacities from 20 to 3,500 gallons per minute. Basically, there are six sets of constant hydraulic shapes around which all Pegson-Sultan pumps are designed. Each set of shapes produces a uniform performance pattern so that a 1½ in. pump for example, is a pure geometric enlargement of any other model in the same hydraulic group. By keeping the suction eye constant for all pumps of the same suction branch diameter it has been possible to reduce the number of parts and increase interchangeability,

* * *

Mr. Duncan Nowson, M.A. (OXON) has joined the polyethylene division of Union Carbide Ltd., as staff assistant to Mr. L. E. Whitmore, director of the division. Mr. Nowson was previously with the Rank Organization, working on company development in the industrial field.

* * *

J. Marr & Son Ltd., of Hull, control a fleet of 14 fishing trawlers and a new one, the *Westella* with a fish-storage room of 18,000 c.ft. capacity, has just gone into operational service. The Distillers Company Limited, Chemical Division, were recently invited to demonstrate their " DisChiL " method for rapidly reducing the temperature of insulated containers. A mobile, bulk liquid CO_2 tanker was driven alongside the *Westella* at the quayside and using a 40-ft. length of hose, the fish room was " DisChiLled " for 15 minutes. The



temperature fell from +10° to 0° C. and three days later, although the mechanical refrigeration installed had not been used, the temperature had risen only to +6° C.

* * *

A new cold room, which provides storage capacity for nearly 1,500,000 pints of beer in 36 glass-lined tanks, was opened at the Reading brewery of **H. & G. Simonds Ltd.,** on January 22, by the company's chairman General Sir Miles C. Dempsey. The tanks are installed in two tiers with a 100 ft. long central working gangway running the whole length of the cold store-room. This arrangement has enabled the planners to install the tanks in two insulated chambers, one on each side of the gangway. Asphalt-faced cork provides a clean, hygienic finish to the outer walls lining the gangway and the working space. Tank fittings project through these walls to allow all operating work to be carried out at normal room temperature. It is learned that Mr. R. E. Southall, A.R.I.B.A., Simonds's chief architect, was responsible for the design and erection of the building. The main contractors were Collier & Catley, of Reading.

* * *

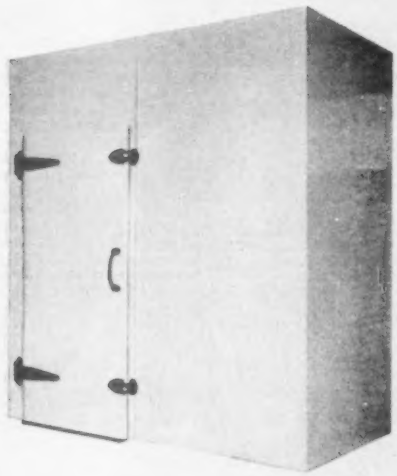
Eurovend Ltd. have just produced the Eurovend " 180," a new, refrigerated, carton vending machine. This is a " universal " vender, in that it will handle any type of carton without the slightest change of parts ; three types of cartons can be housed at the same time. An automatic straw dispenser is supplied as a standard fitting. The Eurovend " 180," 3-column, machine can house 162 ½ pint cartons but if only Tetra Paks or Zu packs are being used then the capacity can be increased to 180. Another model is available, the Eurovend " 120," which will hold, as a " universal " machine, 108 cartons, or 120 if restricted to Tetra Pak or Zu packs.

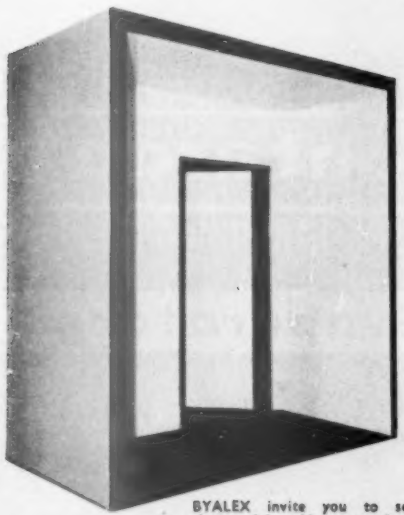
* * *

Two new q.f.f. merchandisers fitted with automatic defrosting systems have been added to the **Iwo Frys** range of cabinets and are now available in the U.K. Known as Everest No. 405 and No. 605, they are of 11·8 c.ft. (length 5 ft.) and 15·4 c.ft. capacity (length 6 ft. 6 in.), respectively. Available in white or ice-blue, these attractively styled cabinets with their deep vacuum sealed front glasses, wide tops and illuminated frozen food signs, provide the maximum amount of sales-compelling display on the minimum floor area. The automatic defrosting system is on the falling air principle

New! BYALEX* *TIMBERFREE* SYSTEM FOR COLD ROOM CONSTRUCTION

The system is based on the stressed skin principle using the inherent strength of the metal covers of the panels forming the skins. The inner and outer skins are locked together by reinforced glass fibre plastic to form a composite structural panel. The Byalex Company has developed this new patented system from its experience in the aircraft industry.





BYALEX invite you to see the model cold room above at Swanley Kent (15 miles from Charing X). Our Engineers will be glad to discuss the application of the system to your requirements.

- The panels are extremely strong, light and are built to take whatever loads required.
- Supplied so that panels slide together on site and fixed by riveting. Assembly is quick and panels are supplied to close engineering tolerances and are dowelled in manufacture in order to take up their correct relative positions.
- The unique timberless sectionalised structure recommends itself for re-erection or extension wherever required. The absence of timber allows this to be done with the greatest of ease.
- Any Insulation material to the thickness required can be used. The cold room is completely insulated as owing to elimination of timber structure. no insulation material is displaced. Owing to its greater efficiency, considerable savings in electricity and plant are achieved.
- Panels are virtually indestructible, easily removed and re-assembled. Glass fibre plastic, used for aircraft and boats, will stand up to deep freeze conditions extremely well. It has a specific strength exceeding that of steel, and is a bad heat conductor.
- The system has been extensively tested by leading multiple grocers and found satisfactory in every way.
- Main application is in fair-sized sectional cold rooms for self-service stores, farms (no external structure needed, cold room can be erected independently outside) and tunnels for the quick-freezing industry.

★ **Patents Pending**

BYALEX CO. LTD.

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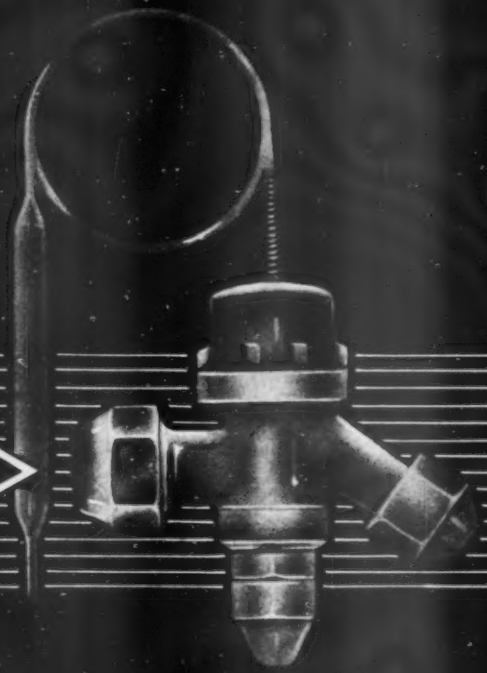
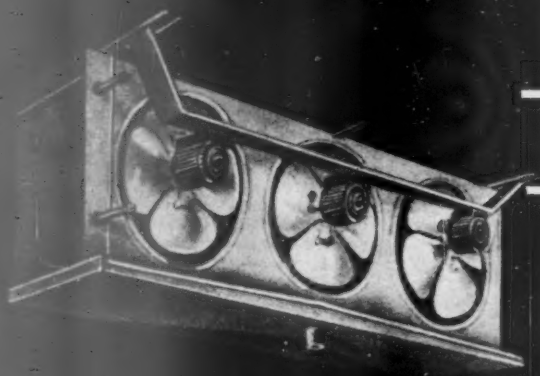
ZELEC

Thermostatic
and Automatic
Expansion Valves



EGELHOF

ZERO ELECTRIC LTD
WALSALL



contardo

Evaporators

ZELEC

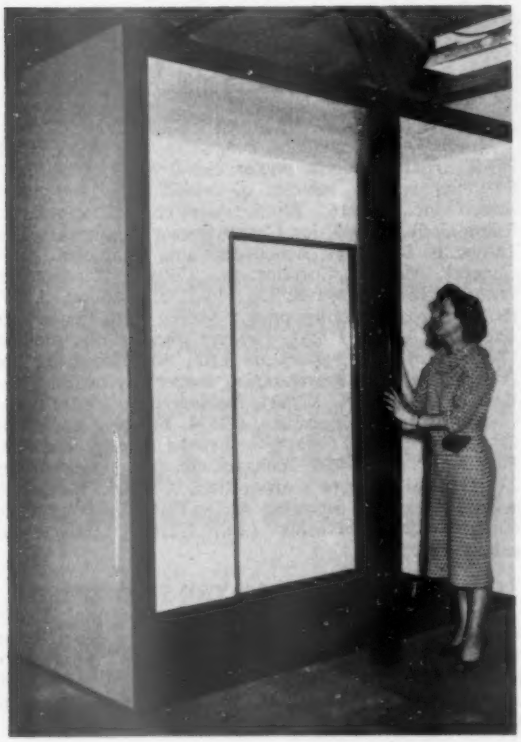
operated by heater elements and controlled by a time clock. No fans are necessary with this system and consequently running and servicing costs are relatively low. Full details of these cabinets and others in the Iwo Frys range can be obtained from M. L. Winsor & Co. Ltd. Finland House, 56, Haymarket, London, S.W.1.

* * *

Refrigeration Spares Ltd., 31 Harrow Road, Leytonstone, London, E.11, have issued a new catalogue listing the "Flica" controls for which they are agents. The company also holds agencies for Martin Bitzer Units, Klockner-Moeller, Herion, and S. and R. Heaters. Large stocks are carried of tubing, tools and fittings for units, compressors, service and display cabinets, and cold rooms, etc.

Timberless Cold Room Construction
Universal Sections an Advantage

A NEW patented system of timberless cold room construction has been developed by Byalex Limited, of Swanley, Kent. This company, which has been manufacturing a large number of components for the Hawker Hunter jet aircraft, discovered some months ago that some of the principles of panel construction for strength applying in the aircraft industry could be equally well applied to the construction of insulated panels for cold rooms. Exhaustive research was entered into to test the theories and a prototype cold room was supplied to a nationally known chain of grocers to try the system under operating conditions. So successful have been these experiments that the grocers have decided to extend the use of the system in their business.



When Byalex considered the design of a new system they worked on the following assumptions. Timber, because of its fibrous nature, tends to carry moisture along its grain. The conventional use of timber in cold room construction is exposed on the warm side to conditions of much higher humidity than on the cold side; such conditions provoke warping and wet and dry rot. When a cold room is used for refrigerating meat or fish there is always the risk that the blood and juices will find their way to the timber where they will cause enzymic decomposition. Timber is not a good heat conductor but its K value is still considerably higher than that of any recognised insulating material. Bad insulating efficiency results in ineffectiveness and unnecessary wear of refrigerating machinery.

On these assumptions it was decided to adopt a timberless construction using the aircraft industry's "stressed skin" principle.

This principle makes use of the great inherent strength of relatively thin metal sheets when held apart by suitably formed webs of metal fastened to both skins in such a manner that they are able to resist relative movement between them. In the case of cold room panels, metal, with a high K value, is replaced by reinforced plastics. These materials have a specific strength exceeding that of steel and are by their nature aelotropic.

In manufacture, the materials used for the skins and for insulation can be specified by the customer. The reinforced plastic web is fixed to the two skins and the cavities filled with insulation material. All panels are made on the tongue and groove principle to engineering tolerances so that erection on site is a simple and precise operation. All sections are datumed for easy identification and posts, beams and cornering attachments are provided.

One of the most attractive advantages of the Byalex system is that cold rooms can be extended

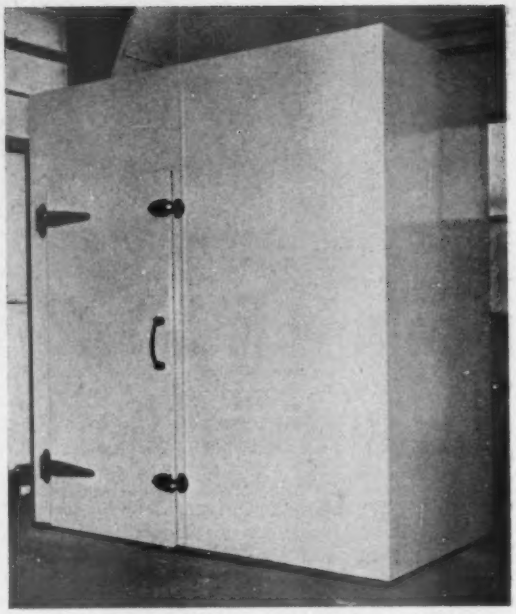
at will by merely adding to them. They can also be taken down and moved to different locations speedily, without the necessity of replacing parts rendered useless by dismantling, and conveniently because of the lightness of the components.

In addition to better insulation through the fact that the cold room is wholly enclosed by insulation material, a higher degree of vapour sealing is also achieved.

Depending on the intended application of the cold room for the storage of frozen food packets, where the walls merely have to support the weight of the ceiling, or for meat storage where carcases have to be suspended from the ceiling—the panels supplied are tailored to the strength required.

Under test it has been shown that a Byalex panel of standard size—8 ft. × 4 ft. × 4 in. thick—supported at 7 ft. 8 in. centres and loaded in the centre, showed a deflection in the centre of ¼ in. of elastic deformation under a 1 ton load.

Byalex manufacture panels of all thicknesses required and panels are made in sizes suitable for the individual job. At this stage they intend to concentrate on supplying sectional cold rooms to the trade 250 c.ft. and over and also processing tunnels for the food industry.



Cabinet constructed on the Byalex principle.

"FREON" IN SPACE

ORIGINALLY developed as a refrigerant, an esoteric chemical now is keeping U.S. satellites positionally stable while they collect data which will advance future adventures into outer-space exploration. Fused with nitrogen to provide sudden thrust in reaction-jet-nozzles, du Pont's Freon-14 helps power a potent new American missile guidance system being used in the Discoverer.

The unit's pneumatic altitude mechanism weighs about 70 lb.—including the torque motors and thrust nozzles, pressure regulator, propellent lines, manifolds, and metal " bottle " containing sufficient supply of nitrogen and Freon-14. Freon was chosen for this orbital guidance system, engineers explain, because it packs a lot of power in a small weight space.

At a predetermined point, the nose cone (re-entry vehicle) can be fired out of orbit into a trajectory calculated to bring it back to earth. Of the eight Discoverer satellites launched by the Air Force Ballistic Missile Div. (from the Vandenberg Air Force Base in California) all but the first have been equipped with Freon orbital guidance.

Final stage engine, provided by Bell Aircraft under a sub-contract to Lockheed, is an integral part of this missile-satellite. After burnout, it remains with the orbiting vehicle.

PATENTS

APPLICATIONS RECEIVED

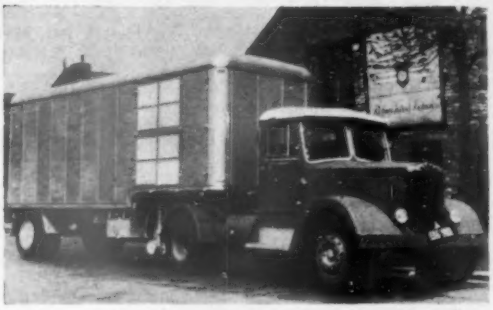
March 4—De Havilland Propellers Ltd. Mack, J. E., P7678, Thermo-electric cooler unit ; McGregor, F. D., P7806, Passenger vehicles air-conditioning apparatus ; Ranco Inc., C7716, Temperature control apparatus ; Relph, J. R., P7649, Ice Cream freezer apparatus. 11—Talbot, E. B., P8721, Air-conditioning equipment. 15—General Motors Corporation, C9080, Refrigeration system. 16—Jeffreys & Co., Ltd., J. Cooling, J. W., P9268, Air-conditioning units ; Moray Firth Foods Ltd., Thornton A. G., P9254, Flowers freezing etc. method. 17—Lancastrian Evaporators Ltd., Alumasc Ltd., and Porter T., P9393, Refrigeration evaporator boxes. 18—Bosch G.m.h.H., R., C9624, Refrigerators closure flaps ; Cherry-Burrell Corporation, C9634, Freezing apparatus. 21—Neilsons (Ice Cream & Frozen Foods) Ltd. and Powling, P. S., P9956, Packages etc. freezing apparatus. 23—General Motors Corporation, C10265, Household refrigerators. 28—Sharples, A. D., P10972, Refrigeration method. 29—Electrolux Ltd., C11009, Refrigerator cabinets etc.

COMPLETE SPECIFICATIONS ACCEPTED

March 23—Westinghouse Electric Corporation, 835,492, Gaskets for refrigeration apparatus or the like ; Ranco Inc., 834,985, Control mechanism for refrigeration systems ; Westinghouse Electric Corporation, 835,190, Refrigeration apparatus. April 13—Carrier Engineering Co., Ltd., 837,244, Air-conditioning.

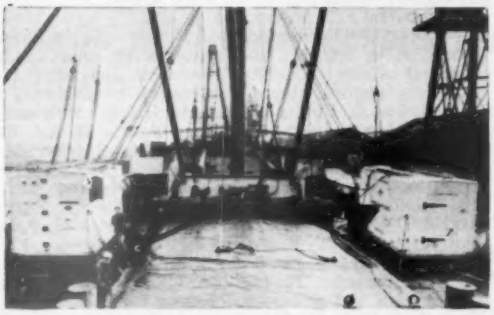
REFRIGERATED TRANSPORT

by STERNE



10-ton capacity refrigerated meat transport vehicle for Iran operating at —10°F.

Refrigerated milk transport vehicle operating at 40°F.



Refrigerated containers for rail and marine transport operating at —10°F.

A —10°F refrigerated venicle for the transport of 3,500 gallons of ice cream.

Sterne refrigerated vehicles and containers operating at temperatures from —10°F to 40°F are in use at home and overseas for the safe and reliable transport of perishable goods. The refrigerating equipment is driven from the mains supply in the depot or by a diesel engine when on the road.

EQUIPMENT SUPPLIED AND INSTALLED FOR ALL TYPES OF REFRIGERATED TRANSPORT

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BRISTOL	Bristol 24038	**HULL**	Hull 31198	**INVERNESS**	Drumchardine 245
CARDIFF	Cardiff 26408	**BELFAST**	Belfast 59211	**AYR**	Ayr 66094
		DUBLIN	Dublin 71316		

AIRLIFT FOR REFRIGERATORS

More than 380 refrigerators were flown from Prestwick to New York on March 22, for distribution in America. With the advent of the new Morphy-Richards "Astral" refrigerator, designed, on this occasion, primarily for the American market, arrangements were made to charter a Super-Constellation freighter aircraft to take the first consignment of these refrigerators direct to New York. By using this method of transportation, which, it is believed, has never been done before on the Atlantic route with a cargo of this kind, the refrigerators were in the consignees' premises within 48 hours of leaving the production lines.

The refrigerator, designed and manufactured in Dundee, is of the built-in type and suitable for wall-installation. It will be used by builders for small flats, caravans and yachts to meet the ever-growing demand. These new refrigerators can be used on either electricity or bottled gas. Having already broken into this market with a previous model, the company has every reason to believe that their sales in the U.S.A. will increase substantially.

A contract for the air-conditioning installation on the new 22,000-ton Shaw Savill liner, *Northern Star*, has been placed with the Carrier Engineering Co. Ltd., of London. The keel of the ship, which is to be built by Vickers-Armstrongs, will be laid this month. Passenger accommodation and public rooms will be air-conditioned throughout with the most modern form of control and air distribution, and each cabin will be fitted with individual control, so that passengers may dictate their own desired climate.

Recently, James North & Sons Ltd., introduced an entirely new kind of glove to the market. Called North Jomac, the gloves are made of a special hard-wearing loop-pile fabric with unusual insulating properties against heat or extreme cold, as well as being exceptionally resistant to abrasion. In response to requests from industry, the line has been enlarged and expanded to cover mitts and sleeves etc., and the entire range is fully illustrated and described in a new leaflet. Copies are available from James North & Sons Ltd., Home Sales Division, Kirkman House, Tottenham Court Road, London, W.1.

New Companies

The accompanying particulars of New Companies recently registered are taken from the Daily Register compiled by Messrs. Jordan and Sons Ltd.

Park Appliances Ltd., 30, Clarendon Road, Harrow, Middlesex. Secretary: D. M. Nunn. To carry on business of retailers, distributors, wholesalers, manufacturers of and dealers in washing mahines, electric irons, fans, refrigerators, etc. Nominal capital £100. Directors: Harry C. Webb, 17 Park Way, Rickmansworth, Herts.; Mrs. Annie E. Nunn, 34, St. Thomas Drive, Hatch End, Middlesex. Registered by solicitors: H. B. Wedlake, Saint & Co., N.4.

Northern Refrigerated Displays Ltd. 55, Cross Street, Manchester, 2. Nominal capital: £3,000. Directors: not named. Subscribers: Samuel A. Ferguson, 55 Cross Street, Manchester, 2 (acct.); J. S. E. Ferguson, 38, Miller Street, Ashton-under-Lyne. Registered by Shaw & Sons, Ltd. Secretary: S. A. Ferguson.

F. Horn (Refrigeration) Ltd. 55, Park Lane, W.1. Secretary: Sheila D. Haynes. Nominal capital £100. Directors: Frits Horn, 24a Trevor Place, S.W.7; Herbert Goodier, 19, Chiltern Court, Baker Street, N.W.1. Registered by Goodier Smith and Co., W.1.

Refrigeration (Display Cabinets) Ltd. Secretary: Rosina Harris. Nominal capital: £1,000. Directors: to be appointed by subscribers. Subscribers: Khoon Yet Foo, 115, Fellows Road, N.W.3 (clk.); Rosina Harris, 105, Howberry Road, Stanmore (secretary). Registered by H. A. Just & Co. Ltd.

F. Horn (Household Electrical Equipment) Ltd., 55, Park Lane, W.1. Secretary: Sheila D. Haynes. Nominal capital: £100. Permanent directors: Frits Horn, 24a, Trevor Place, S.W.7; Herbert Goodier, 19, Chiltern Court, Baker Street, N.W.1. Registered by Goodier Smith & Co., W.1.

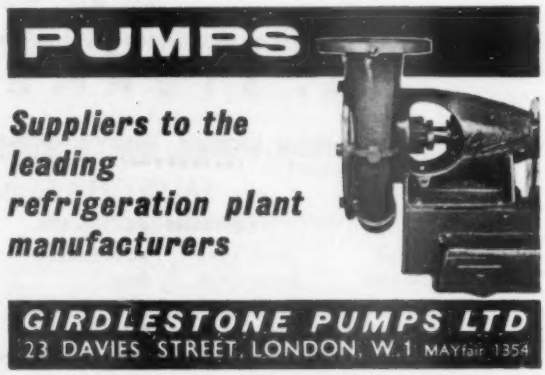
Westmead Services Ltd., 42, High Street, Sutton, Surrey. Secretary: Muriel M. Gravett. To carry on the business of hot water, heating, ventilating and refrigeration engineers, etc. Nominal capital £100. Directors: Muriel M. Gravett, 17, Shirley Avenue, Sutton, Surrey; Wm. Bell, 10, Cavendish Road, Sutton, Surrey.

Cumberland Refrigeration and Ventilation Co. Ltd., 127a, North Avenue, Southend-on-Sea. Nominal capital: £500. Directors: Alfred B. Cumbers, 127a, North Avenue, Southend-on-Sea; Leslie R. Buston, 17, St. Leonards Road, Southend-on-Sea; Mrs. Alice E. Cumbers and Dorothy M. Buxton. Solicitors: Humphrey K. C. Ward & Co., Southend-on-Sea. Registered by F. S. Moore, Ltd.

Norbeth Building Services Ltd. To carry on the business of specialists in domestic and industrial air-conditioning, etc. Nominal capital: £10,000. Permanent directors: Norman Collisson, Pretoria House, Ambrosden, nr. Bicester, Oxon; Gwendoline E. Collisson, Pretoria House, Ambrosden, nr. Bicester, Oxon. Solicitors: Alfred Truman & Son, Bicester. Registered by Jordan & Sons Ltd.

Pitkin & Ruddock Ltd., 27, Northgate, Beccles. To carry on business of refrigeration and electrical engineers, etc. Nominal capital: £1,000. Permanent directors: Derrick P. Ruddock, 4, The Prairie, Lowestoft; Patrick G. Pitkin, 27, Northgate, Beccles. Registered by Charles Double, Ltd.

G. D. Barnett Ltd., 89c, Broad Street, Canterbury. Secretary: Beryl E. Barnett. To take over business of an electrical, refrigeration and power transmission engineer carried on at Canterbury by G. D. Barnett, etc. Nominal capital: £1,000. Directors: Gordon D. Barnett and Beryl E. Barnett, "Woodlands," Fleet Lane, Tyler Hill, Canterbury. Registered by Shaw & Sons, Ltd.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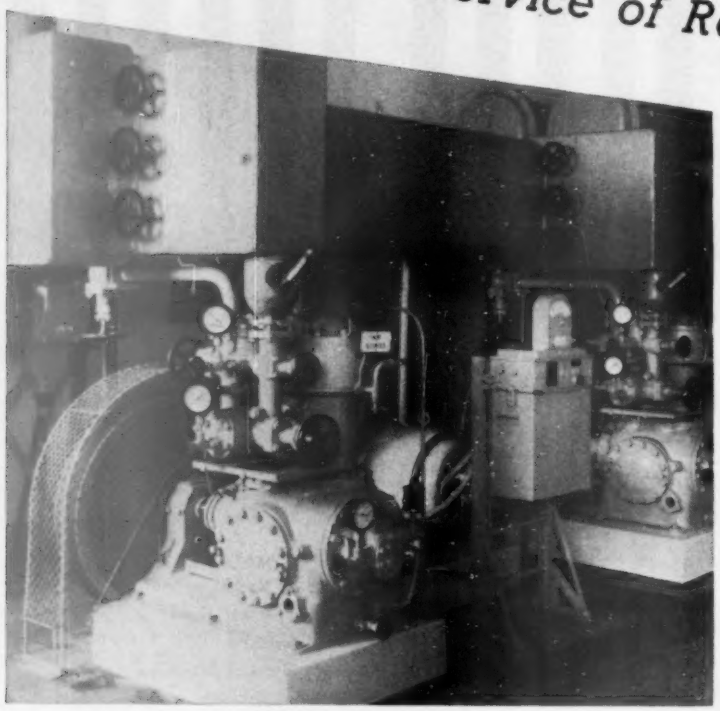

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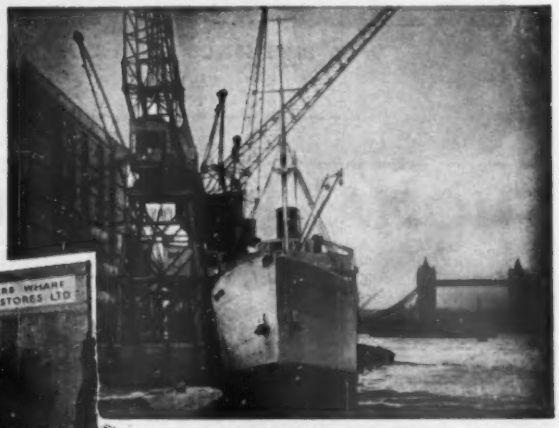

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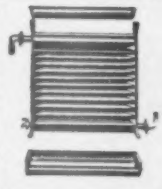

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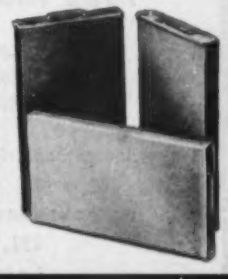

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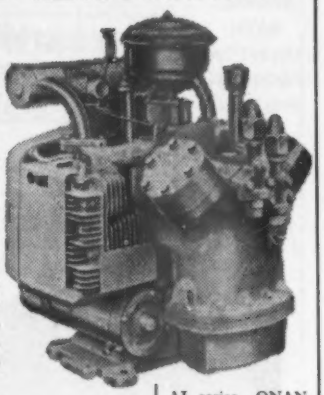

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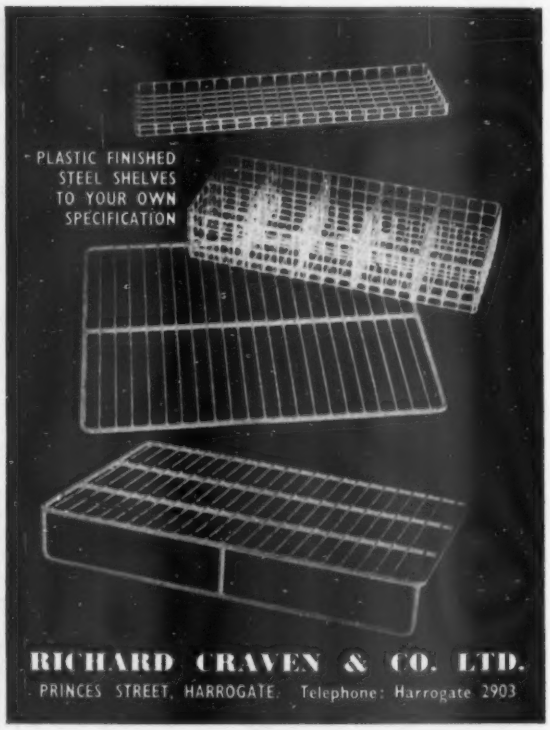

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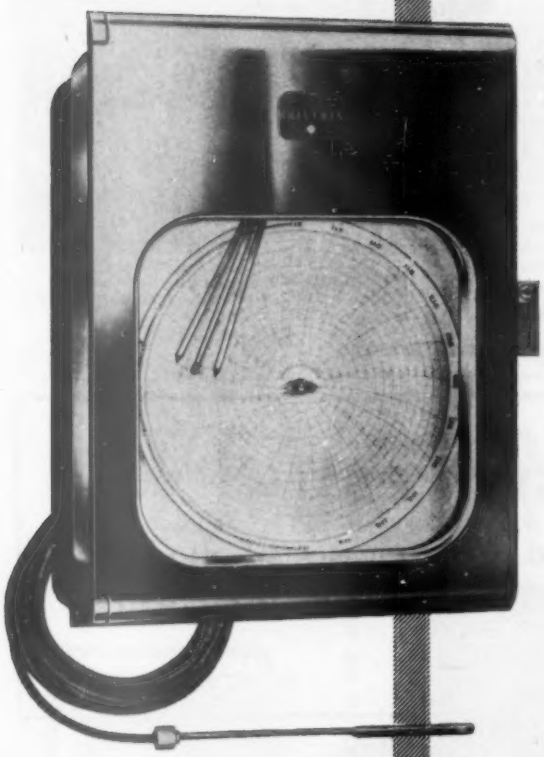

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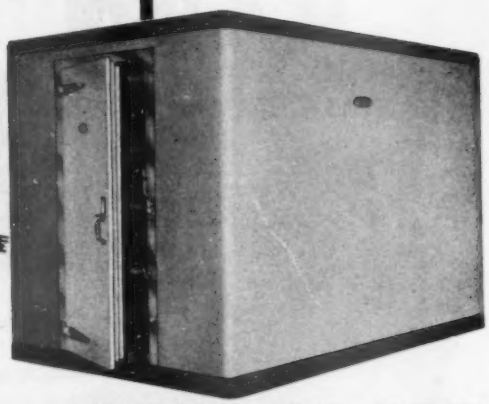

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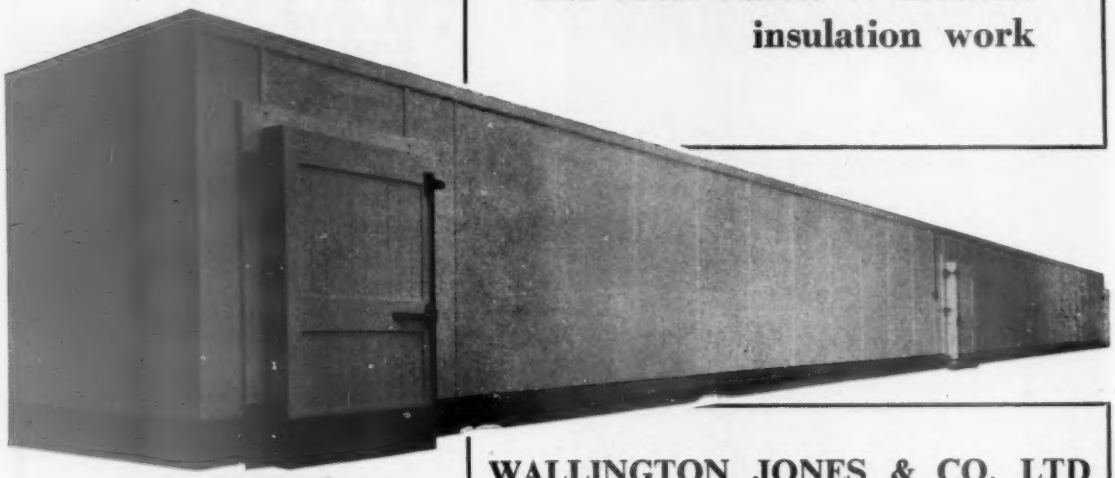

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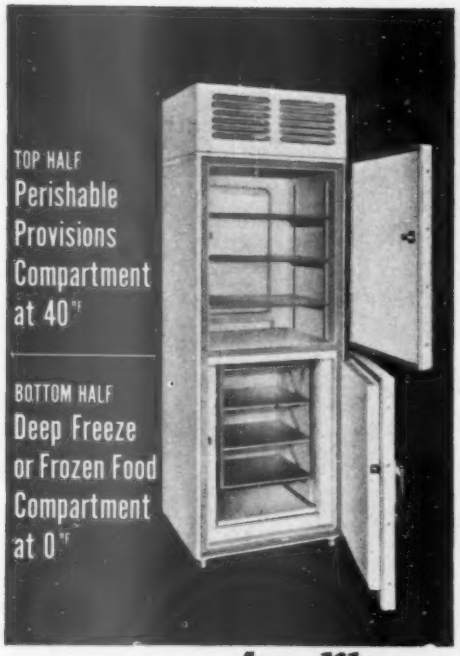

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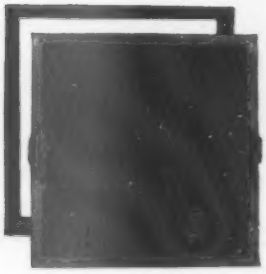

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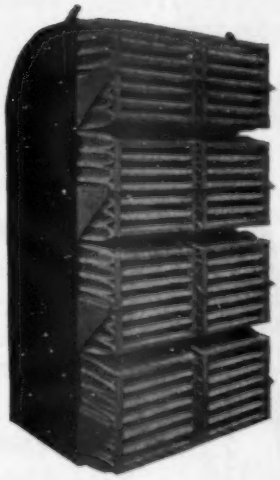

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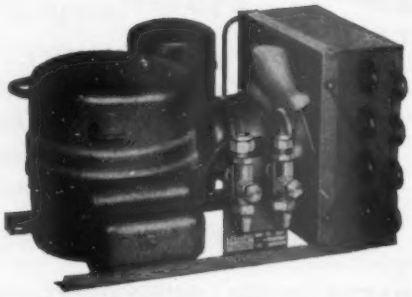

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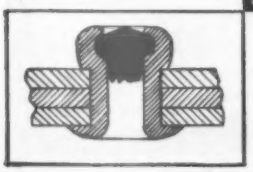

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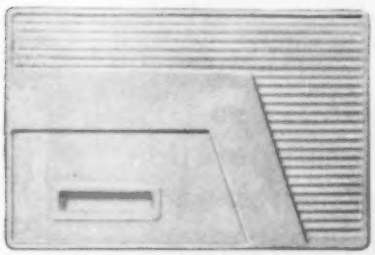

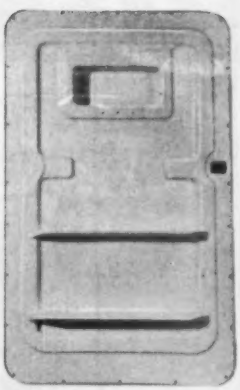

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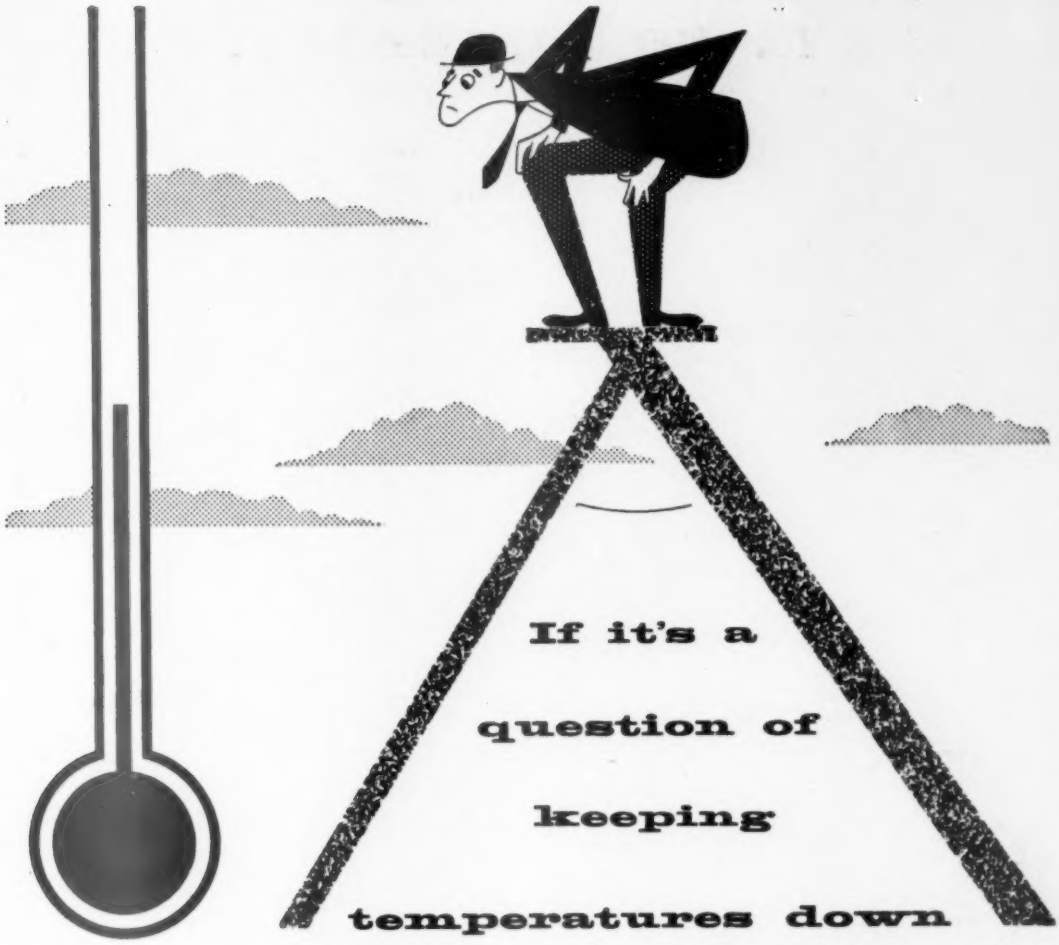

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